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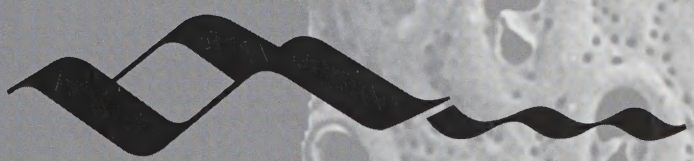
RE-DESCRIPTION AND REVISION OF SMITT'S "FLORIDAN BRYOZOA" IN THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY

Judith E. Winston



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Memoir Number 7

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RE-DESCRIPTION AND REVISION OF SMITT'S "FLORIDAN BRYOZOA" IN THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY

DEDICATION

Thomas Joseph Morton Schopf
1939-1984.

Photograph taken at the third International Bryozoology Association meeting. 1974, on a field trip to Marseilles Harbor. Tom's rediscovery of the Smitt collection at the Museum of Comparative Zoology, Harvard University, led to this publication.

RE-DESCRIPTION AND REVISION OF SMITT'S "FLORIDAN BRYOZOA" IN THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY

Judith E. Winston

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with An Annotated Catalogue of Specimens Collected by L. F. de Pourtalès in Florida and Carolina, Housed at the Museum of Comparative Zoology, Harvard University

Virginia Museum of Natural History
in association with the
Smithsonian Institution

Memoir Number 7
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2005

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RE-DESCRIPTION AND REVISION OF SMITT'S "FLORIDAN BRYOZOA" IN THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY

Judith E. Winston[1]
Virginia Museum of Natural History

with
An Annotated Catalogue of Specimens Collected by
L. F. de Pourtalès in Florida and Carolina, Housed at the
Museum of Comparative Zoology

Thomas J. M. Schopf[2]
and
Judith E. Winston[1]

Abstract

This paper re-describes the "Floridan Bryozoa" specimens belonging to the collection of the Museum of Comparative Zoology, Harvard University, and updates their nomenclature and classification. During cruises of the United States Coast Survey in 1867-1869, Louis Agassiz's former student and assistant, Louis François de Pourtalès, collected bryozoans and other invertebrates from deep and shallow water off the coasts of Florida, Cuba, and North Carolina. The bryozoan material served as the basis for publications by Pourtalès (1867) and F. A. Smitt (1872-1873) in which seven and 29 species respectively were newly described. Many of the specimens were deposited in the Naturhistoriska Riksmuseet, Stockholm by Smitt, but a large portion of the collection was also returned to the MCZ. The Smitt MCZ collection includes some of the most common tropical western Atlantic species from reef and shelf habitats, some beautiful and unique deep water species that have not been reported since that time, and several shallow water species with ranges extending both north and south of Cape Hatteras, making it a significant resource for bryozoan taxonomists.

The Smitt MCZ collection includes material of 68 species. There are syntype lots of 18 species described by F. A. Smitt (or described by L. Pourtalès and re-described by Smitt) in the collection, as well as at least five specimens originally figured by Smitt in his 1872 or 1873 publications. Fifteen new species are here described from the Smitt MCZ material, along with four new genera, and four new families. Finally, one additional new species is described on the basis of related material from Florida.

Introduction

The purpose of this paper is to re-describe the "Floridan Bryozoa" specimens belonging to the collection of the Museum of Comparative Zoology, Harvard University, to update their nomenclature and systematic position, and to make that collection accessible to users. The Smitt MCZ collection includes material of 68 species from Florida, Cuba, and North Carolina. There are syntype lots of 18 species described by F. A. Smitt (or described by L. Pourtalès and redescribed by Smitt) in the collection, as well as at least 5 specimens originally figured by Smitt in his 1872 or 1873 publications. Restudy of the collection has shown that there are a number of additional species which were either overlooked by Smitt, or called by the names of European forms with which they cannot be synonymized (as Smitt had done in the original works). Some samples were also found to consist of a mixture of several species, not all of them recognized by Smitt. In addition, there have been many changes in our understanding of phylogenetic relationships,

[1] Virginia Museum of Natural History, Martinsville, Virginia 24112
[2] formerly Department of Geophysical Sciences, University of Chicago

and associated changes in nomenclature, since Smitt's time. Therefore, 15 new species are here described from the Smitt MCZ material, along with four new genera, and four new families. Finally, one additional new species is described on the basis of related material from Florida.

The core taxonomic work on the bryozoans of the tropical Western Atlantic originated with collections made off the Florida Keys, Straits of Florida, and Cuba by Louis Agassiz's former student and assistant, Louis François de Pourtalès, during cruises of the United States Coast Survey in 1867-1869. At that time the main purpose of Coast Survey expeditions was to gain a better understanding of the Gulf Stream. Most of the on-board scientific work consisted of determining temperatures and velocities of the Stream and charting depths and bottom topography beneath its path. But the character of the bottom under the Gulf Stream, and the presence of "peculiar forms of animal life"(Pillsbury 1891) were also of interest. This was the dawn of the era of great oceanographic expeditions and the beginning of modern exploration of the sea. The distribution and biogeography of the "deep-sea" fauna, which, given the technology of the time, was anything living deeper than 200 fms, was unknown. Even the existence of such a fauna was questioned. On the basis of his own work in the Aegean, Professor Edward Forbes of the University of Edinburgh had claimed that nothing could live in the sea below 300 fms (1,800 ft), and other scientists were eager to prove or disprove his claim.

Between the years of 1845 and 1860 vessels of the Coast Survey worked the waters from Havana to Cape Cod. According to Pillsbury (1891), "Mr. L. F. Pourtales and Professor Louis Agassiz accompanied the vessels at different times for the purpose of collecting and arranging the results of the dredging operations."

In 1867 Coast Survey Assistant Pourtalès participated in a cruise on the Steamer *Corwin* commanded by Captain R. Platt, USN, and under the scientific direction of Professor Henry Mitchell. The expedition made soundings and took current readings between Key West and Havana to depths of 600 fm. They had an additional mission, also. Their soundings were to be used to locate a path for a telegraph cable to be laid between Key West and Havana. Even though the planned dredging work was curtailed in extent by an outbreak of yellow fever on board, the results were exciting, for, as Pourtalès wrote in his report, they showed clearly that "*animal life exists at great depths, in as great a diversity and as great an abundance as in shallow water.*" (Pourtalès, 1867: 105 – italics his). Louis Agassiz' scientist son Alexander wrote enthusiastically of the dredging results in a November 1868 letter to his friend Fritz Müller:

> Prof Peirce the Superintendent of the Coast Survey deputed one of his Assistants Pourtalès to make dredgings there. His first results of which you have undoubtedly received a copy No. 6 Bull. M.C.Z. were so important that, it was decided to send Pourtalès again this winter, and he goes again in a couple of weeks better equipped and with the experience he has gained last year we may hope to obtain grand results. The fauna living to a depth of 500 fathoms = 3000 feet = 10 atmospheres![1] is Wonderfully Rich in EVERY THING Echinoderms, Corals, Ophiurans, Starfishes, Annelids, Crustacea Mollusca, etc and as soon as he returns we will all set to work and work up his material which cannot fail to be of greatest importance.... (A. Agassiz, p. 201 in Winsor 1976).

In 1868 and 1869 Pourtalès again participated in dredging, this time on the Survey steamer *Bibb* with Captain Platt again in command. In 1868, dredging operations covered the outer Florida reef tract from Cape Florida to Tortugas, dredging off Sombrero Key, Bahia Honda, American Shoal, the Samboes, Sand Key, and Tortugas. In 1869 the Survey worked the Keys from Tortugas south to Cuba, east to Cay Sal Bank, back to the northern part of the Keys and over to the Bahamas. They dredged off Rebecca Shoal, East Key, the Marquesas Keys, the Quicksands, Boca Grande and Sand Key, then in the Nicholas Channel, off Cojima, near Havana, off Cayo Cruz del Padre, on the Cuban side of the Nicholas Channel, at Double Headed Shot Keys off Cay Sal Bank, then off Conch Reef, French Reef, the Elbow Reef, Carysfort Reef, and Turtle Harbor (northern Florida Keys), off Orange Key, Bahamas, then French Reef, Key West Tennessee Reef, Alligator Reef, Conch Reef and Pacific Reef.

Pourtalès himself described seven bryozoans obtained from 270 fms. off Havana, Cuba, in "Contributions to the fauna of the Gulf Stream at great depths" (1867). However, Louis Agassiz asked a young Swedish biologist, Fredrik Adam Smitt, to examine and describe the rest of the bryozoans collected on these expeditions. Smitt had done his dissertation research on bryozoan development and growth, and had gone on to carry out important taxonomic work on Scandinavian bryozoans (published between 1864 and 1868). He had also acquired first hand knowledge of North American marine biology by participating as the zoologist on the Swedish Expedition of the frigate *Joséphine* to Portugal, the Azores, and North America in 1869, an expedition focused on depth limits of marine organisms (Schopf & Bassett 1973).

The bryozoan material collected was the basis for publications by Pourtalès (1867) and Smitt (1872-1873) in which 7 and 29 species respectively were newly described. Most of these species were later cited by other workers on the region who also found them in collections from the southeast Atlantic coast of the U.S., the Gulf of Mexico and the Caribbean. According to Schopf and Bassett (1973) they constitute about a quarter of the known tropical American bryozoan fauna. Most types and figured specimens were deposited in the Naturhistoriska Riksmuseet, Stockholm, but a large portion of the collection Smitt had studied was eventually returned to the MCZ. However, for some reason it was never catalogued, and its existence in the Museum of Comparative Zoology had faded from the awareness of bryozoan workers by the time that Thomas J. M. Schopf began studying east coast bryozoans in the 1960s. The

[1]Actually closer to 100 atmospheres

collection was actually rediscovered by Joseph Hazel, of the U. S. National Museum, who happened upon it while studying the MCZ ostracod collections, and told Tom Schopf about it.

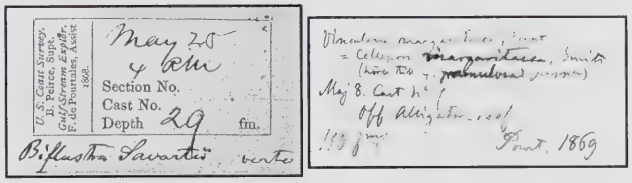
It seemed to Tom that his own taxonomic work on bryozoans of the continental shelf of the U.S. east coast would require examination and perhaps re-description of these specimens. Although his work and illustrations were excellent for their day, Smitt shared certain biases of his time, among them the belief that the "deep-sea fauna" was uniform, or, as he put it in the introduction to part I of his study, "I have felt the greatest interest in finding well-known Scandinavian forms living there among tropical and antarctical ones." Since the Florida work was published before the return of the *Challenger* Expedition (1872-1876), let alone the work-up of its collections, there was no way he could have known otherwise. However, by the 1960s, bryozoologistist were skeptical of such claims, and Tom wished to learn what the specimens themselves could tell him.

Tom borrowed the specimens from the MCZ and began a preliminary catalogue, as the specimens had never received MCZ catalogue numbers. I had been a graduate student of Tom's at the University of Chicago, and had done my postdoctoral work on Florida bryozoans (Winston 1982). After I moved to the American Museum in 1980, Tom and I agreed that I would carry out further examination and SEM study of the collection, and we would collaborate on a publication. I began that work in 1984, shortly before Tom's untimely death.

Scanning of most of the specimens was carried out at AMNH between 1984-86, however, completion of the project was postponed repeatedly for various reasons. But Tom was right about its necessity (as he was about so many things to do with bryozoans), and I eventually found I could not complete further work on the east coast bryozoan fauna without this study because the collection includes 1) some of the most common tropical western Atlantic species from coral reef and continental shelf environments, 2) some beautiful and unique deep water species that have not been collected (at least in any published work) since that time, and 3) several shallow water species with ranges extending both north and south of Cape Hatteras, thus making it important for work on the northeastern U.S. coast as well. I have completed the following study in his memory, and am publishing the catalog he began in his name.

Materials and Methods

Tom Schopf began the project by going through all the specimen lots, which were housed in old cracked test tubes, cardboard pill boxes, stoppered glass jars, and various second hand containers, evidence of 19th century museum frugality. Some were misplaced; some had lost their labels. He separated some of the lots that contained more than one species, found additional containers for them, and created a typed and numbered catalogue, based on the label data and telling the kind of container the specimen was in, as well as any collecting information included. He numbered each lot with a red wax marking pencil. Some specimens had tags with species names attached to the container to the specimen with thread, as well as inner labels. Most of those collected in 1868 had printed labels (as shown below). Other containers had only hand-written labels. Ink on some containers was badly faded, and in a few cases, in bottles in which the original preservative had evaporated over



time, the ink was no longer visible – in some cases a label Tom had been able to read (in 1967) had faded completely by the time I inheritedthe collection for study in the early 1980s. Tom also made a separate list of localities where Pourtalès collected on both the 1868 and 1869 expedition, as well as a list of probable type material.

Once the collection was passed on to me at AMNH, I examined each numbered lot several times, using Tom's catalogue as a guide, and picked out representative specimens of each species to scan. Most specimens were cleaned with bleach and coated before being scanned – cleaning was usually necessary to show the characters needed for determination, and the electron microscopes used at that time were not capable of taking good images of uncoated material in most cases. I scanned one or more specimens of each species I could detect in the collection, whether or not it had been recognized as distinct by Smitt. I made notes on the size and condition of colonies or colony fragments, and prepared an annotated revision of the catalogue. I also took the usual measurements of taxonomic characters, using a Wild M5 microscope, at 50-100X. Six measurements of each characters for three specimens of each species were measured if material was sufficient. Six measurements for each character on one or two colonies were made if only one or two colonies were available. Note that for a number of the species only one specimen was found in the collection, and it was not always possible to get six measurements of each character, if the specimen was small, non-reproductive, worn, or damaged. Measurements are summarized in species descriptions, and measured specimens noted in the revised catalogue. I also made comparisons and took comparative measurements on other specimens from VMNH, MCZ or NMNH specimens as necessary.

The collection was then rehoused, along with original labels, in conservation approved plastic boxes and returned, along with an electronic file of the catalogue,to the Museum of Comparative Zoology, where the specimens received official MCZ catalogue numbers. New Taxa are authored by me except as follows: the family Foveolariidae, is co-authored with Dennis Gordon, based on his research on the group and his preliminary classification for the cheilostome volume of the Treatise on Invertebrate Paleontology. Family Trypostegidae is co-authored with Dennis and with Kevin Tilbrook, who is carrying out a revision of that group.

Species Represented in Smitt MCZ Collection

Smitts' Identification	Updated Identification
Crisia denticulata	*Crisia carolina*
Idmonea atlantica	*Exidmonea flexuosa*
Idmonea milneana	Exidmonea milneana ?
Not identified by Smitt	*Lichenopora* sp.
Not identified by Smitt	*Proboscina* sp.
Bugula flabellata	*Bugula rylandi*
Not identified by Smitt	*Halophila antillaea*
Cellularia pusilla	*Scrupocellaria pusilla*
Cellularia cervicornis	*Scrupocellaria regularis*
Caberea retiformis	*Canda retiformis*
Nellia oculata	*Nellia tenella*
Farcimia cereus	*Amplexicamera cereus*
Cellaria tenuirostris	*Cellaria bassleri*
Membranipora canariensis	*Cupuladria biporosa*
Membraniporella agassizii	*Callistopora agassizii*
Micropora coriacea	*Micropora acuminata*
Cupularia umbellata	*Discoporella depressa*
Cupularia doma	*Cupuladria doma*
Steginoporella elegans	*Steginoporella magnilabris*
Biflustra denticulata	*Biflustra denticulata*
Biflustra savartii	*Biflustra arborescens*
Cribrilina radiata	*Puellina saginata* (in part)
Cribrilina innominata	*Puellina testudinea* (in part)
	Puellina smitti (in part)
Cribrilina figularis var. *floridana*	*Reginella floridana*
Escharipora stellata	*Triporula stellata*
Porellina ciliata	*Microporella protea*
Porina serrulata	*Colatooecia serrulata*
Porina subsulcata	*Bracebridgia subsulcata*
Porina violacea	*Reptadeonella bipartita*
Porina plagiopora	*Reptadeonella hastingsae*
Tessaradoma boreale	*Tessaradoma boreale*
Mamillopora cupula	*Mamillopora cupula*
Gemellipora eburnea	*Gemellipora eburnea* (in part)
Gemellipora glabra forma *striatula*	*Trypostega striatula*
Gemellipora glabra forma *typica*	*Gemelliporina glabra*
Hippothoa porosa	*Escharina porosa*
Stylopoma spongites	*Stylopoma smitti* (in part)
	Stylopoma minuta (in part)
	Stylopoma projecta (in part)
Hippothoa isabelleana	*Cribellopora constellata* (in part)
	Schizoporella pungens (in part)
Hippothoa mucronata	*Hippopleurifera mucronata*
Hippothoa biaperta	*Stephanollona serratum* (in part)
	Stephanollona asper (in part)
	Pourtalesella incrassata (in part)
Cellepora tuberosa	*Buskea minutiporosa*
Cellepora avicularis	*Turbicellepora pourtalesi*

Smitts' Identification	Updated Identification
Cellepora margaritacea	*Buskea margaritacea*
Escharella pertusa	*Hippoporina caribaea*
Escharella rostrigera	*Hippaliosina rostrigera*
Escharella bisinuata	*Petraliella bisinuata*
Escharella jacotini var. *spathulata*	*Parasmittina spathulata*
Escharella landsborovii	*Parasmittina betamorphaea*
Not identified by Smitt	*Paramittina floridana*
Lepralia cleidostoma	*Schedocleidochasma cleidostomum*
Lepralia edax forma *janthina*	*Hippotrema janthina*
Lepralia turrita	*Trematooecia turrita*
Retepora marsupiata	*Reteporellina marsupiata* (in part)
	Schizellozoon elongatum (in part)
Discopora albirostris forma *pusilla*	*Hippoporella pusilla*
Discopora albirostris forma *typica*	*Celleporaria albirostris* (in part)
	Celleporaria sherryae (in part)
	Celleporaria magnifica (in part)
	Trematooecia aviculifera (in part)

Acknowledgements

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Systematic Accounts

Order Cheilostomatida
Suborder Malacostegina Levinsen 1902
Superfamily Membraniporoidea Busk 1852
Family Membraniporidae Busk 1852

Genus *Biflustra* d'Orbigny, 1852

Revised Diagnosis: Colony encrusting to erect, zooids with gymnocyst absent, but with moderate to extensive cryptocyst underlying frontal membrane. No uncalcified bands in lateral walls. Spatially constrained kenozooid development may occur. No pore chambers or internal hooks or spines. Ovicells and avicularia lacking

Discussion: Following Lagaaij 1952, Bishop 1987, Taylor & Foster1994, Bishop & Hayward 1997, *Biflustra* d'Orbigny 1852, type species *Biflustra ramosa* d'Orbigny 1852, is used here for membraniporid species with no gymnocyst and with moderate to extensive cryptocyst. It should be noted, however, that as Bishop states, this argument does rely on acceptance of the traditional concept of its most wide-spread Recent species, *Biflustra savartii*, described by Audouin (1826), for which no type material exists and for which the exact locality, Egyptian Red Sea or Mediterranean, is uncertain.

Biflustra denticulata (Busk), 1856
Figs. 1-3 (Smitt MCZ no. 48)

Membranipora denticulata Busk, 1856: 176, pl. VII, figs. 1, 2.
Biflustra denticulata Smitt, 1873: 18, pl. IV, Figs. 89-91.
Hemiseptella denticulata Canu & Bassler, 1928b: 62, pl. 9, fig. 9.
Hemiseptella hexagonalis Canu & Bassler, 1928b: 63, pl. 28, fig. 9.
Acanthodesia savartii Osburn, 1940: 352, pl. 2, figs.16, 17.
Acanthodesia tenuis Osburn, 1940: 353 (in part).
Membranipora savartii Maturo, 1957: 35, fig. 27; Shier, 1964: 607; Long & Rucker, 1970: 19, figs. 2.1, 2.2; Winston, 1982: 119, fig. 28.
Biflustra savartii Rucker 1967: 817, Fig. 12a, Taylor & Foster, 1994: 2, pl. 1, figs. 3-6.

Materials Examined: MCZ Smitt no. 48. *Biflustra denticulata.* Jan. 27, 1868. 1 1/4 mi. S. of Sand Key, 10 fms. Pourt. VMNH No. 3103.00. Fort Pierce Inlet, Fort Pierce, Florida. Beach drift. J.E. Winston 14 July 2003. VMNH No. 2692.00. Walton Rocks, S. Hutchinson Island, St. Lucie Co., Florida. Beach drift. J. E. Winston 14 July 1999. VMNH No. 2836.00. Coquina Beach, Anna Maria Island, Manatee Co., Florida. Beach drift. J. E. Winston 22 July 2002.

Description: Colony white to beige, usually encrusting in one or more layers (e. g., Fig. 3), in some habitats developing into foliose masses. Zooids rectangular to sub-quadrangular, distal ends more rounded, proximal angles sharp, and proximal margins straight to concave. Outer rim of lateral walls of beaded calcification, no gymnocyst, frontal membrane underlain by a tubercular, beaded cryptocyst which covers a variable amount (ranging from almost none to up to a third or a half) of the proximal and lateral edges of the frontal surface (Figs. 1, 2). This cryptocyst may develop sharp triangular denticles projecting into the otherwise solely membranous part of the frontal surface, sometimes with a larger proximal or lateral denticle or cluster of denticles standing out. There may also be large single or paired round to sub-triangular tubercles (Fig. 3) in zooid proximal corners. No avicularia or ovicells occur.

Discussion: Smitt used the name *denticulata* of Busk 1856, thus identifying his Florida material with *Membranipora denticulata*, the species Busk described on shells from Mazatlan in the Gulf of California. Busk's original description and illustrations depict a species morphologically indistinguishable from material from the Florida Keys, Caribbean, and Gulf of Mexico. He even noted the presence of the "rounded or triangular eminences on many of the cells in front and below", although he speculated that they might be ovicells. Despite this Smitt showed uncertainty about the identity of this species and the species that followed in his discussion, indicating that the above material might belong to M. *tuberculata* (now *Jellyella tuberculata*) instead. His uncertainty was not unreasonable. The two species are very similar in zooid size, and *Jellyella tuberculata*, though characterized by its two large, rounded distal tubercles, frequently shows extensive development of the proximal cryptocyst (e.g., fig. 27, in Winston 1982) Specimens of *Jellyella tuberculata* from Florida sometimes display such intermediate characteristics as to make one suspect hybridization, but internal examination always shows them to have the wing-like spinous processes and spinules that distinguish *tuberculata*. The sample present in the MCZ collection contains only *Biflustra denticulata*. Since Smitt states that his material was collected by Pourtalès

Biflustra denticulata	Lz	Wz	Lopesia	Wopesia	Lcorner tubercles	Wcorner tubercles	Loperc	Woperc
N	12	12	12	12	10	10	6	6
MEAN mm	0.58	0.36	0.27	0.22	0.07	0.06	0.1	0.12
ST DEV mm	0.06	0.05	0.04	0.05	0.03	0.01	0.01	0.01
RANGE min	0.486	0.27	0.198	0.126	0.04	0.05	0.09	0.108
max	0.684	0.45	0.342	0.28	0.108	0.09	0.108	0.126

from 10 fathoms, it was likely from the same station as the material pictured here from the MCZ collection, although the MCZ material may not contain the fragments Smitt actually illustrated.

Canu & Bassler (1928b) recognized Smitt's species, but added a new species, *hexagonalis*. However, although they claimed that *hexagonalis* differed from *denticulata* in its "granulated and much smaller cryptocyst", their illustration shows what appears to be the same species, merely a colony with a regular array of zooids with paired corner tubercles. More recently, authors, probably following Harmer (1926), have synonymized all Atlantic and Caribbean material with the Indo-West Pacific species, *Biflustra savartii*. Although the type locality of *B. savartii* may be unknown, the name seems to have been long accepted and used for an abundant and widespread Indo-Pacific species. In this paper, I have chosen to retain Busk's and Smitt's name for specimens from his study area. Although morphological differences between West Atlantic/Caribbean/Gulf and E. Mediterranean/Indo/West Pacific populations may be slight, genetic work with populations of *Membranipora membranacea*, another membraniporid species with cyphonautes larvae, has shown Atlantic and Pacific populations to be quite distinct (Schwaninger 1999). It seems quite likely that a similar molecular analysis for *B. "savartii"* would have similar results, transforming what traditionally was considered one wide ranging species, into a species complex or group of cryptic species. Even Baja California populations might turn out to differ significantly genetically (in which case Canu & Bassler's *hexagonalis* might need to be reinstated for Florida populations). My own work in the greater Western Atlantic-Caribbean-Gulf of Mexico area indicates that there are several membraniporoid species complexes or groups present, including a "*paulensis-vaughni*" group, a "*tenuis-denticulata-arborescens-limosa*" group, and a lagoonal or brackish Conopeum "*tenuissimum-chesapeakensis-seurati*" group. Cook (1968b) pointed out the apparent intergradation among colonies of *tenuis*, *savartii* and *arborescens* (Cook, 1968b: 128), and the necessity of further work on larval form, early astogeny, and the effects of environmental variation on zooid and colony morphology in this group. Even without molecular genetics, it may be possible to resolve some of the problems by a careful statistical analysis of zooid parameters from different populations, but that is beyond the scope of this work.

Distribution: Cape Hatteras to Brazil, East Pacific to Gulf of California.

Biflustra arborescens (Canu & Bassler) 1928
Figs. 4-6 (Smitt MCZ#47)

Biflustra savartii Smitt, 1873: 20, pl. IV, figs. 92-95. NOT *Biflustra savartii* Audouin, 1826: 240, pl.10, figs. 1, 2.

Acanthodesia arborescens Canu & Bassler, 1928c: 15, pl. I, figs. 2-5.

Conopeum commensale Marcus, 1937: 35, pl. 5, fig. 13; 1939: 126, pl. 6, figs. 5A, 5B, 5C; 1941: 16, fig. 5; Maturo, 1957: 37, text-fig. 29; Lagaaij, 1963: 166, pl. 8, fig. 2; Shier, 1964: 610. NOT *Conopeum commensale* Kirkpatrick & Metzelaar, 1922: 185, pl. 7, fig. 2.

Membranipora arborescens Cook, 1968a: 138, pl. 8, fig. g; 1968c: 121, pl. 1, figs. B-D; pl 2, fig. E, text-fig. 2; 1985: 83; Winston, 1982: 119, figs. 25, 26.

Material Examined: Smitt MCZ #47. *Biflustra savartii* verte. May 25, 1868. 4RM, 29 fm. "Type Floridan Bryozoa, fig. 95". *Biflustra arborescens.* VMNH no. 1055.00. Riis Park, New York, N. Y., S. Flashburg, May 1992. VMNH no. 2137.00. [probably subfossil]. Wreck Island, Northampton Co, Va., P. Brannon, 23 Mar. 2000. VMNH no. 2046.00. Sunset Beach Inn beach, Cape Charles Northampton Co., Va., J. E. Winston 16 Aug. 1993. VMNH no. 1685.00. Ocean Isle Beach, Ocean Isle, Brunswick Co., N.C. C. Carter, 6 May 2000. VMNH no. 690.00 Walton Rocks, South Hutchinson Island, St. Lucie Co., Florida, J. E. Winston, 19 Feb. 1999.

Description: Colony white to gray or brownish, displaying a variety of colony forms, depending on substratum, habitat and age. Initially encrusting, unilaminar, often becoming multilaminar around the initial substratum by self overgrowth. Flat colonies encrust mollusk shell and carapaces of crustaceans and *Limulus*. In high energy environments forms free living bryoliths, multilayered balls completely engulfing the original bit of shell or other substratum. On the sandy southeastern U.S. coast, where hard substrata are rare, subtidal colonies often encrust gorgonian and hydroid stems, fishing line, and other narrow flexible substrata as well as shell fragments. These colonies can become several layers thick leading, once the substratum decays, to colonies in the form of erect, rigid cylinders or tubes. Zooids likewise variable, ranging from subrectangular (curved distal rim and almost straight lateral and proximal sides) to ovoid or almost hexagonal. A narrow to broad shelf of granular-surfaced cryptocyst extends inward under the frontal membrane from the beaded mural rim. Rather than being flat until it meets the lateral wall (as in *denticulata*), the cryptocyst is thickened at its outer edges, sloping gradually downward from the top of the mural rim to the edge of the membranous center of the frontal surface. Small denticles of calcification may project into the membranous area (Fig. 6). Paired gymnocystal tubercles may occur, and in some cases increased calcification results in coalescence into a calcareous pillow across the width of the zooid (e.g., fig. 26 in Winston 1982). The cuticle of the zooids is more heavily chitinized than that of *B. denticulata* zooids. A brown line (still present in Smitt's material) often outlines the edges of zooids and the frontal membrane may bear delicate chitinous spinules (not present in the skeletal colony Smitt illustrated). No avicularia. No ovicells.

B. arborescens	Lz	Wz	Lop	Wop
N	13	13	13	13
MEAN mm	0.47	0.38	0.31	0.21
ST DEV mm	0.05	0.05	0.06	0.04
min	0.396	0.288	0.198	0.144
max	0.54	0.46	0.4	0.28

Discussion: The MCZ specimens, which include the fragment illustrated by Smitt as Fig. 95, show the erect growth mode often encountered in *B. arborescens*. Cook (1968b) discussed the confusion between this species and *Membranipora commensale*, which occurs only on shells inhabited by pagurids. So, far as we know the species *Membranipora commensale* does not occur in the Western Atlantic, Caribbean, or Gulf of Mexico regions. All putative *commensale* specimens from those areas examined by Cook belonged instead to *B. arborescens* or to M. *tenuis* (Cook, 1968b). In addition to its strict habitat limitation, M. *commensale* can be distinguished from M. *arborescens* by its lack of cryptocystal denticles, budding of zooids in fan-shaped groups, inability to produce erect expansions when growing encrusting edges meet, and production of groups of kenozooids at those meeting points. Although Cook made the distinction between *arborescens* and *commensale* clear, she did not solve the problem of the distinction (or lack of distinction) between *B. arborescens* and M. *tenuis*. As she noted (1968c: 124) in her discussion of *B. arborescens*, Recent and fossil American specimens from the southeast showed intergradation between the forms called M. *tenuis* and those called M. *arborescens*, "Dr. Scolaro's specimens are here discussed under M. *tenuis*, but it must be noted that large areas of zooids in the colonies are indistinguishable from encrusting M. *arborescens*, and if they had been assigned to that species." And, in her discussion of M. *tenuis*, "It must be stressed, that were any one of the groups of zooids from both the west African or American colonies isolated, it could confidently be assigned to M. *arborescens*, M. *savartii*, or M. *tenuis*, depending upon the degree of variation displayed. Further, zooids from adjacent groups in the same colony could be referred to different species."

Distribution: Western Atlantic: Long Island-Brazil, Caribbean, Gulf of Mexico.

Suborder Flustrina Smitt 1868
Superfamily Calloporoidea Norman 1903
Family Calloporidae Norman, 1903

Callistopora new genus

Diagnosis: Colony erect, quadriserial, zooids with frontal shield composed of flattened, interlocking spines. Ovicell with inner layer exposed in large lacunae. Paired distal avicularia. Rows of marginal kenozooids, flat cuticle-covered ovals, in later ontogeny becoming bubble-like kenozooids with oval opesia proliferating and partly calcifying over frontal surfaces in older regions of colony.

Type species: *Callistopora agassizii* Smitt 1873.

Etymology: from the Greek Kallistos = most beautiful.

Callistopora agassizii (Smitt), 1873
Figs. 7-14. (Smitt MCZ # 134)

Membraniporella agassizii Smitt, 1873: 11, pl. V, figs.103-106; Osburn, 1940: 404.

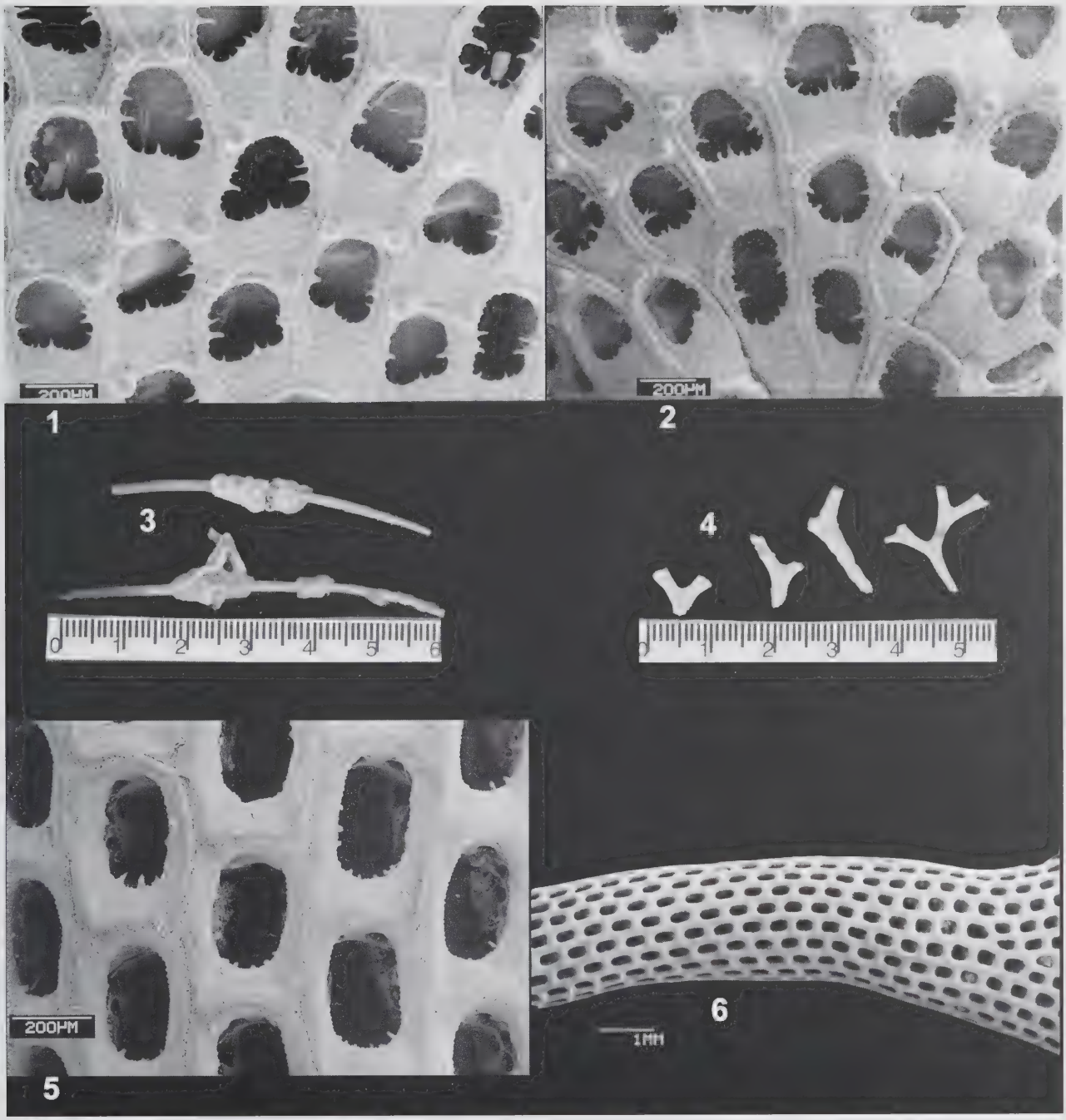
Material Examined: Membraniporella agassizii. Syntype. MCZ Smitt #134, 4 March 1969, Cast no. 1. Off Cojima, Cuba. 450 fms. 3 branch fragments.

Description: The colony is erect, rigid, and quadriserial, composed of delicate curving ivory white branches with a translucent glassy calcification and pale golden chitinous parts. Zooids are elongate-oval in shape, the elliptical frontal membrane covered by a shield formed by the interlocking or fusion at zooid mid-point of the bifurcated tips of about 21 closely juxtaposed, smooth textured, flattened spines. The orifice is semicircular. Small pore chambers (Fig. 14), are present at zooid margins. The distal-most pair, on either side of the orifice, are modified as oval avicularia with distolaterally directed mandibles and a pair of condyles, but no crossbar (Figs.11-13). Ovicells (Figs. 10-11) are helmet-shaped, and imperforate, but for three membranous or less calcified openings. Ovicells are not closed by the zooidal operculum, but have a separate opening. In older parts of the colony, secondary calcification of the pore chambers as warty, tubercular kenozooids spread to form a secondary layer that covers the frontal wall of the zooid (Smitt, figs. 104-105). The beginning of this process can be seen at the base of the MCZ specimen illustrated (Fig. 13).

Discussion: Although Smitt gave an excellent description of zooids, SEM study shows that ovicells are not made up of ribs like those of zooids (as depicted in his illustration, Pl. V, fig.), but are solidly calcified, with three membranous or less calcified spots. They appear to develop as distal caps that gradually calcify proximally and frontally, and with their glassy calcification do look rib-like under the light microscope.

Although the species has not been collected again, it has been discussed by Levinsen (1909: 17) and Hastings (1964: 258, 262; 1966: 68), who pointed out that production of a secondary layer, perhaps strengthening, in erect colonies by proliferation of avicularia or kenozooids is known in several other species.

The genus *Membraniporella* was created by Smitt in his discussion preceding the description of this species (p.10). To Smitt this new species, with its erect growth form, represented a high degree of colony organization. He envisioned a morphological series between it and the encrusting boreal Eastern Atlantic species *Membraniporella nitida* (Johnston 1838) which he chose as the type of the genus. The problem with *Membranipora agassizii* is that unlike *Membraniporella nitida* and other species included in *Membraniporella*, in which the ovicell is closed by the fertile zooid operculum, the ovicell in *agassizii* has a separate opening.



Figures 1-6. Fig. 1. *Biflustra denticulata.* Smitt MCZ no. 48. Zooids with well developed denticulate cryptocyst and corner tubercles. Fig. 2. *Biflustra denticulata*, another group of zooids. Fig. 3. *Biflustra denticulata.* Smitt MCZ no. 48. Colonies at natural size. Fig. 4. *Biflustra arborescens* (=*Biflustra savartii* of Smitt 1873). Life size colony fragments. Fig. 5. *Biflustra arborescens* (=*Biflustra savartii* of Smitt 1873). Smitt MCZ no. 47. Zooids with granular cryptocyst and denticles. Fig. 6. *Biflustra arborescens* (=*Biflustra savartii* of Smitt 1873). Smitt MCZ no. 48. Branch portion, showing rectangular shape and regular arrangement of zooids.

Callistopora agassizii	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	6	6	6	6	6	6	6	6
MEAN mm	0.68	0.48	1.92	0.22	0.28	0.3	0.13	0.08
ST DEV mm	0.04	0.03	4.39	0.01	0.03	0.01	0.02	0
RANGE min	0.63	0.45	0.126	0.198	0.234	0.288	0.108	0.072
max	0.72	0.522	10.89	0.234	0.306	0.324	0.162	0.081

Hastings (1966) declared the specimen in the Riksmuseum, Stockholm to be the holotype, not knowing there was syntype material in the MCZ collection.

Distribution: This delicate species apparently occurs only in deep water. It was collected by Pourtalès from 823 m off the north coast of Cuba and it could be expected to occur at other deep water localities in the region.

Family Quadricellariidae Gordon, 1984

Genus *Nellia* Busk, 1852

Nellia tenella (Lamarck) 1816
Figs. 15-19 (Smitt MCZ #31)

Cellaria tenella Lamarck, 1816: 135.

Nellia oculata Busk, 1852:18, pl. 64, fig. 6; pl. 65, fig. 4; Smitt, 1873, 3, pl. I, figs. 53-54; Osburn, 1914: 191; 1940: 400; 1947: 25; 1950: 119, pl. 13, fig. 4; Canu & Bassler, 1928b: 26; Marcus, 1939: 131, Est. VIII, 9A-C; Shier, 1964: 622.

Nellia tenella Levinsen, 1909: 120; Cheetham, 1966: 48, fig. 28; Cook, 1968a:156, pl. 9, fig. g; Winston & Cheetham, 1984: 258, figs. 1, 2; Fransen, 1986: 41, fig. 14.

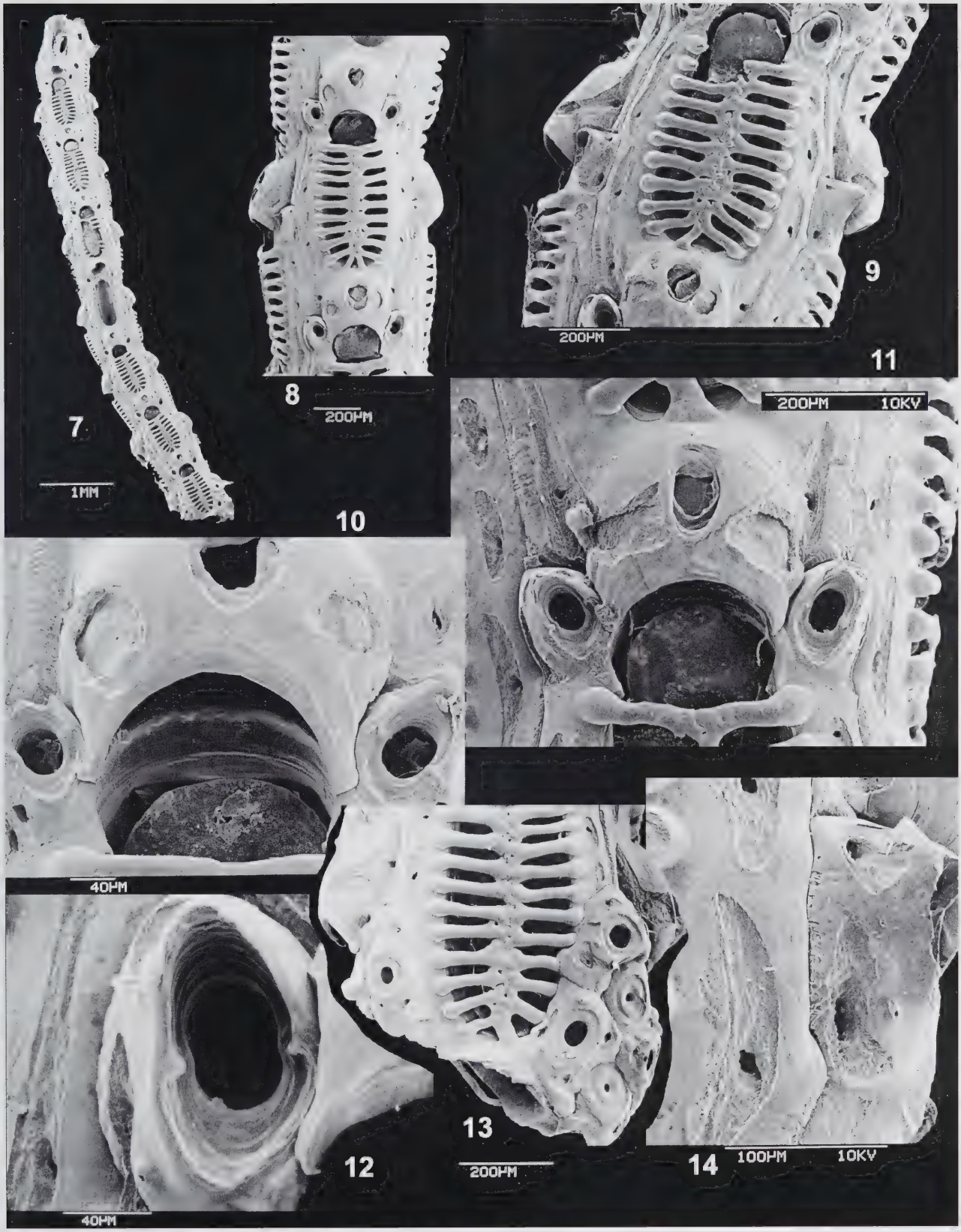
Material examined: Nellia oculata. Smitt MCZ # 31. May 4, 1868, 10 [off Sand Key], 82 fm. Pourt. *Nellia oculata.* Smitt MCZ # 35. Jan 11, 1868. Off Tortugas. MCZ no. 105, 15 fms, off Key West, Florida, MCZ, no.106, 15-20 m off Key West, L. F. Pourtalès, coll. MCZ 112, 1877-78, 36 fms, 24°34' N, 83°16' W, *Blake*, no. 12. *Nellia tenella.* VMNH no. 2628.00. Juno Ledge, off West Palm Beach, Palm Beach Co.,Florida, D. & M. Littler, 18 Jul 1999. VMNH no. 2592. *Nellia tenella.* Spanish Anchor site, off Palm Beach, Palm Beach Co., Florida, D. & M. Littler, 03 Jul 2002. VMNH no. 2788.00 S. Beach causeway, Fort Pierce Inlet, Fort Pierce, St. Lucie Co., Florida, J.E. Winston, 03 Jul. 2002..

Description: Colony erect, rooted, spreading and bushy white branches (Fig. 15). Branches narrowly 4-sided, consisting of internodes with 4-7+ zooids, connected by chitinous joints, with a row of elongate subquadrangular zooids along each side (Fig. 17). The evenly bifurcating branching pattern of the species (Fig. 16) is distinctive; two new branches, from 60-almost 90E opposed, bud from the opposite two distal-most zooids of an internode. A pair of small oval avicularia with semicircular mandibles (Fig. 19) is located proximolaterally on each zooid. Ovicells are lacking on the one specimen in the Smitt material, but when present they are inconspicuous, forming a globular chamber within the maternal zooid, visible outwardly only as a crescentic double ridge of calcification with a frontal transverse fenestra showing above the orifice (see Fransen, 1986: fig. 14b). The colony is attached by rhizoids which grow out of the proximal gymnocyst of basal zooids (e.g., in fig. 16).

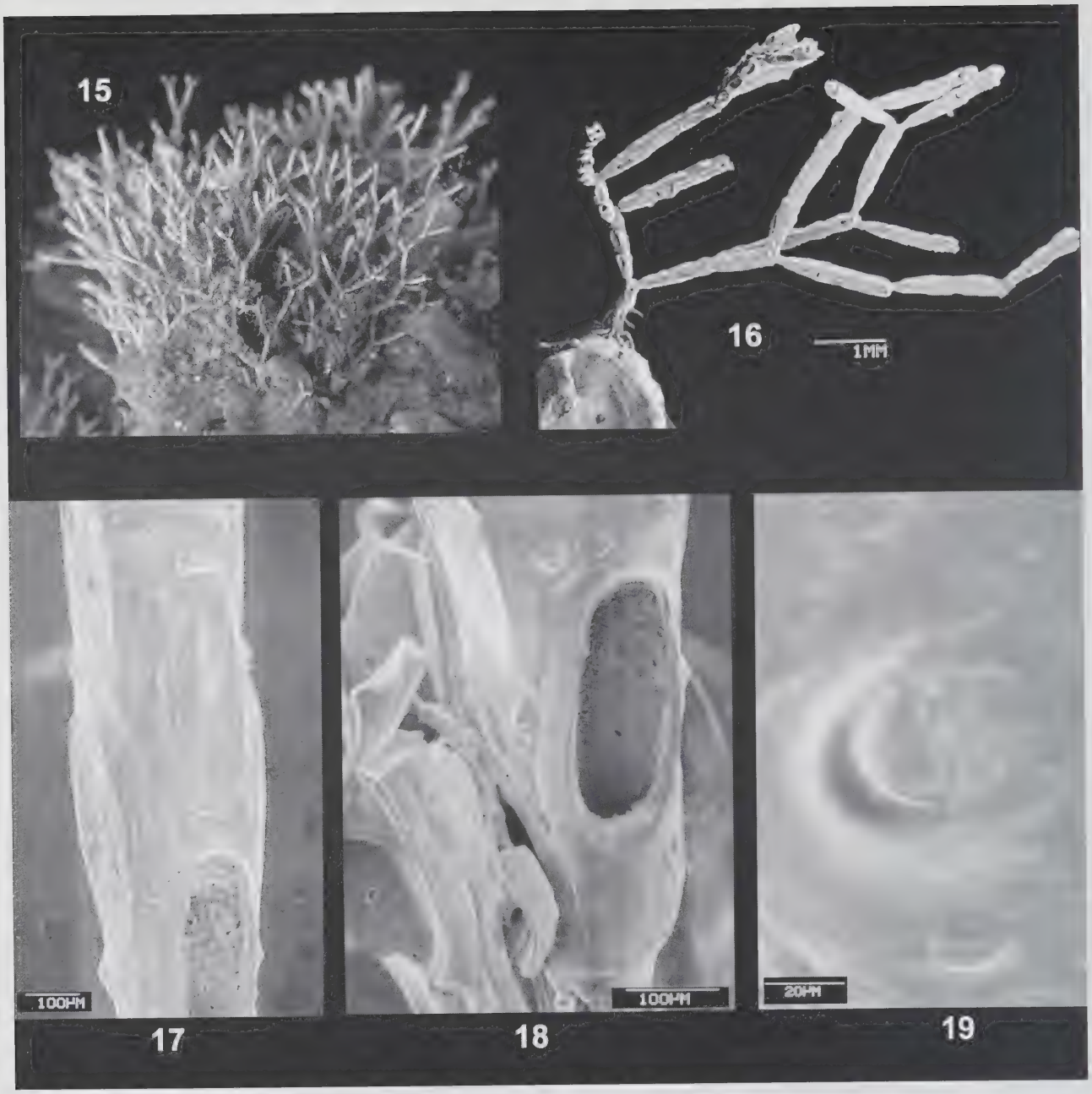
	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN	0.46	0.17	0.07	0.08
ST DEV	0.03	0.01	0.01	0.01
MIN	0.414	0.162	0.054	0.072
MAX	0.486	0.18	0.09	0.09

Discussion: Although Lamarck's types were at one point believed lost, synonymy and justification for the use of Lamarck's name *Nellia tenella* and its priority over *Nellia oculata* (Busk 1852) appeared in Cheetham (1966), pp. 48-52. Since then d'Hondt (1979, 1993, 1994) has made a thorough study of the provenance of the bryozoan collections in the collection of the Museum National du Histoire Naturelle, Paris, identifying, among others, Lamarck's type of *Nellia tenella*, which does exist (no. 4545), although the original label in Lamarck's handwriting has been lost (d'Hondt 1994). The only intact colony in the Smitt MCZ material was illustrated without bleaching, to keep the joints intact, but some calcified zooecial skeletons (including internal muscle scars), can be seen in Fig.18, taken in an area where zooids were dead.

Distribution: Circumtropical-subtropical. Tolerating both full and somewhat reduced salinities, and occurring at depths ranging from the intertidal to more than 400 m. Fossil occurrences also, noted in Cheetham (1966), Lagaaij (1969), Lagaaij & Cook (1973), and Winston & Cheetham (1984).



Figures 7- 14. *Callistopora agassizii* (=*Membraniporella agassizii* of Smitt 187) Smitt MCZ no. 134. Syntype. Fig. 7. Branch of colony. Fig. 8. Portion of a branch, showing quadriserial arrangement of zooids. Fig. 9. Close up of zooid, showing fused bifurcating spines. Fig. 10. Ovicell with paired avicularia. Fig. 11. Another ovicell showing three lacunae in calcification. Fig. 12. Close up of an avicularium. Fig. 13. Cluster of kenozoids. Fig. 14. Close-up of marginal pores.



Figures 15-19. *Nellia tenella*. Fig. 15. Photograph of living colony of *Nellia tenella*, embedded in sponge. Fort Pierce Inlet, Florida, showing characteristic bifurcating branching pattern. Fig. 16. *Nellia tenella* (=*Nellia oculata* of Smitt 1873). Smitt MCZ no. 35, entire colony. Fig. 17. *Nellia tenella* (=*Nellia oculata* of Smitt 1873). Smitt MCZ no. 35, several zooids, still with dried tissue and cuticle. Fig. 18. *Nellia tenella* (=*Nellia oculata* of Smitt 1873). Smitt MCZ no. 35. Partially skeletal zooid, showing position of avicularia. Fig. 19. *Nellia tenella* (=*Nellia oculata* of Smitt 1873). Smitt MCZ no. 35. Close-up of avicularium showing semi-circular mandible.

Family Foveolariidae Gordon & Winston, new family

Diagnosis: Colonies erect or encrusting in various morphologies ranging from unilaminar encrusting, to frondose from an encrusting base, to jointed, cylindrical. Zooids with no oral spines or temporary deciduous oral spines (*Odontionella*), but with a bipartite cryptocyst having an inner granular, steeply descending portion, and a perforated outer portion. Avicularia adventious, single or paired, oval to pointed, without crossbars. Ovicells hyperstomial, becoming immersed in secondary calcification with age.

Type genus: Foveolaria Busk, 1884. The genus also includes *Amplexicamera*.

Discussion: Smitt's *Amplexicamera cereus* has no close relatives in the tropical Western Atlantic region. With its bipartite

cryptocyst, with a sharply demarcated opesiar portion and perforated outer portion, it appears most closely related to *Foveolaria*, a southern hemisphere genus with species found from magellanic South America to New Zealand.

Amplexicamera, new genus

Diagnosis: Colony erect, with jointed internodes. Ovoid zooids with bell-shaped opesia surrounded by granular cryptocyst, and with a porous interzooecial cryptocystal area between zooids. Paired avicularia at distal ends of zooids. Internal ridges, depressions, and occlusor muscle scars. Ovicells with central pores, endozooidal, formed partly by the maternal and partly by the distal zooid.

Type species: Farcinia cereus Pourtalès.

Etymology: The name *Amplexicamera* is a combination of the Latin *amplector, -exus* = encircle, enfold, embrace (based on the structure of the ovicell) and *camera* =chamber with an arched roof.

Amplexicamera cereus (Pourtalès) 1867
Figs. 20-29. (Smitt MCZ # 169)

Farcimia cereus Pourtalès, 1867: 110; Smitt, 1873: 3, pl. I, figs. 55-56.

Etymology: Pourtalès named the species *Farcimia cereus*. *Farcimia*, junior synonym of *Cellaria*, is feminine, but as Pourtalès used *cereus*, rather than *cerea*, it appears he meant the species name to be from *cereus*, L. wax taper or candle, used as a noun in apposition, rather than the adjectival form, *cereus,-a,-um*, of wax, waxy. Therefore the species name remains *cereus*, even when linked with another feminine genus name.

Material Examined: Farcimia cereus. Smitt MCZ # 169. 270 fms, off Havana. Syntypes, several branches. Pourtalès described the species from this locality, where it was, according to him "rather abundant". *Nellia cereus* [with *Gemelliporina limbata*]. MCZ no. 140. n.d.. "Blake" Sta. 26, 24°37.5' N; 83°36' W [SW of Tortugas], 110 fms. A. Agassiz. NMNH, dry bryozoan collection, Albatross Stn. 2354. 30 January 1885. East of Yucatan, 20°59'30" N; 86°23'45" W, 130 fms. Ovicelled specimen (Figs. 25, 26, 27). Unbleached specimen (Fig. 21) showing frontal membranes, zooid opercula and branch base with part of a joint attached.

Description: The colony is erect, with narrow jointed, curving, quadriserial branches (Figs. 20-22). Zooids are elliptical in shape, with a bell to figure-eight shaped opesia, the proximal and lateral portions of the frontal membrane underlain by a finely beaded cryptocyst. At the distal end of each zooid is a rectangular interzooidal area with similar granular calcification, penetrated by several large pores. Two small rounded interzooidal avicularia without cross-bars occur at the distal ends of zooid opesia (Figs. 28, 29). Fertile zooids are slightly larger than autozooids and have the opesia enlarged and ovoid in shape. The ovicell (Figs. 25, 26, 27), closed by the fertile zooid operculum, is immersed, convex, with diagonal sutures showing its origin partly from the interzooidal area and partly from the distal zooid, which develops a large membranous window in its proximal cryptocyst.

	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	0.46	0.17	0.07	0.08
ST DEV mm	0.03	0.01	0.01	0.01
RANGE min	0.414	0.162	0.054	0.072
max	0.486	0.18	0.09	0.09

Discussion: Smitt placed the species between *Nellia* and *Cellaria* in his descriptions, but then stated that the similarities of these species with the above two, which were based on the articulation of the branches, were superficial, and that "The great differences, in the form as well as in the developmental changes of the zooecia, throw them a long way from each other" (Smitt, 1873: 5). Re-examination of his specimens and NMNH specimens from a single *Albatross* station show some additional characters for analysis, but the affinities of the species are still problematic. In zooid and ovicell morphology it shows similarities with members of the Calescharidae, especially *Caleschara minuta* Maplestone (1909) (see Cook & Bock 2001), but *Caleschara* have no avicularia. It may be more similar to chaperiids like *Bryopastor* (Gordon 1982). Although there are no occlusor laminae, the distal zooid interior shows ridges and depressions as well as conspicuous occlusor muscle scars (e.g., Fig. 29), such as occur in species of *Bryopastor*. The endozooidal ovicells, appearing as a bulge in the proximal portion of the distal zooid are also similar. However, *Bryopastor* is defined as having no avicularia. The chaperiid genus *Patsyella* (Brown 1948), as defined by Gordon (1982), seems even more similar, as it includes species with vincularian growth habits, in which spines and avicularia may be present.

Distribution: Although not mentioned in the literature since Smitt's publication, it is present in other collections (see material examined) and may be expected to be found in deep water collections from the region.

Family Cupuladriidae Lagaaij 1952
Genus *Cupuladria* Canu & Bassler 1919

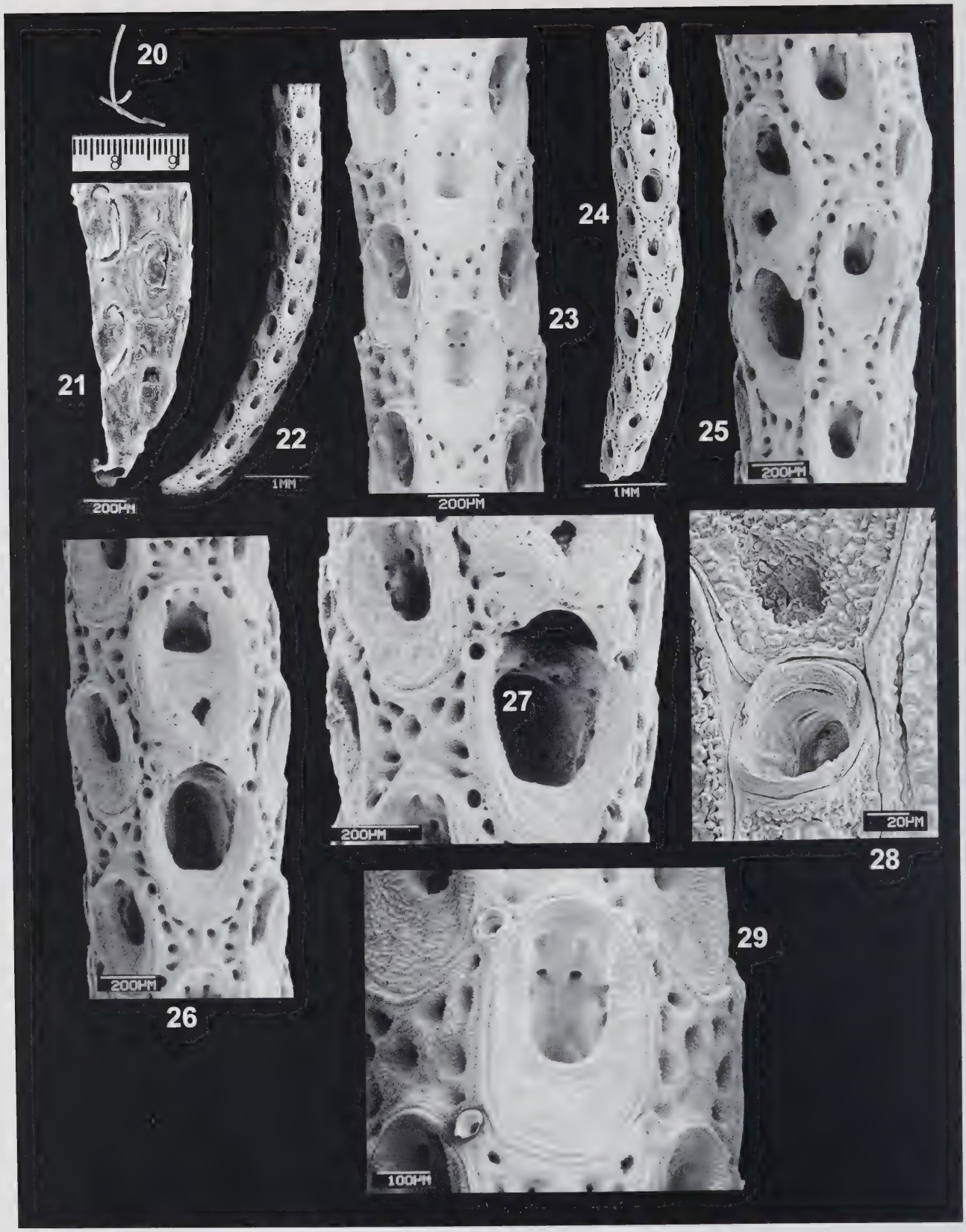
Cupuladria biporosa Canu & Bassler 1923
Figs. 30-37. (Smitt MCZ # 14, 145)

Membranipora canariensis Smitt, 1873: 10, pl. 2, figs. 69-71

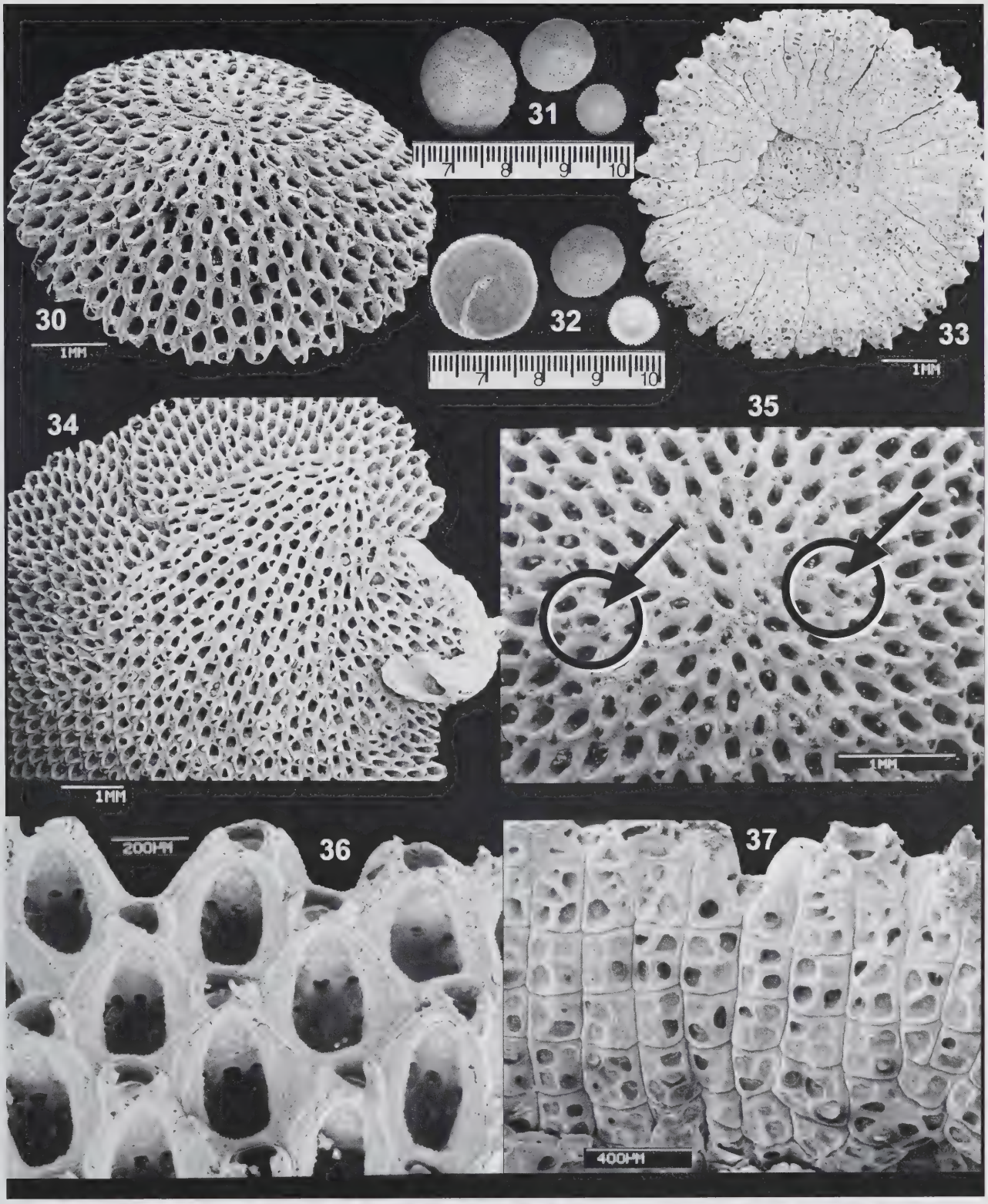
Cupuladria biporosa Canu & Bassler, 1923: 29, pl. 47, figs. 1-2; Cook, 1965b: 203, pl. I, figs. 2A, B, 3A, B, 4A, B, 5, 6 A, B, text-fig. I, g-j.

Cupuladria canariensis Canu & Bassler, 1928b: 16 (In part = text-fig. 2); Marcus & Marcus, 1962: 285, pl. 1, figs. 1-2; Lagaaij, 1963b: 225 (In part = pl. 26, figs. 4,5).

Cupuladria sp. Cheetham & Sandberg, 1964: 1021.



Figures 20-29. *Amplexicamera cereus* (Pourtalès) 1867 (= *Farcimia cereus* of Smitt 1873). Fig. 20. Branch, life size. Syntype. Smitt MCZ no. 169. Fig. 21. Unbleached USNM specimen (Albatross Stn. 2354), showing jointed proximal end of internode. Fig. 22. Branch from Smitt MCZ # 169, Syntype material. Fig. 23. Autozooid series. **Syntype.** Smitt MCZ no. 169. Fig. 24. Reproductive branch of USNM colony showing position of ovicells. Albatross Stn.2354. Fig. 25. Close-up of ovicelled branch. Albatross Stn.2354. Fig. 26. Another view of ovicelled branch. Albatross Stn.2354. Fig. 27. Close-up of ovicelled zooid. Albatross Stn.2354. Fig. 28. Close-up of avicularium. Syntype. Smitt MCZ no. 169. Fig. 29. Autozooid, showing position of avicularia. **Syntype.** Smitt MCZ no. 169.



Figures 30-37. *Cupuladria biporosa* Canu & Bassler 1923 (= *Cupularia stellata?* of Smitt 1873). Fig. 30. Entire colony. Smitt MCZ # 145. Fig. 31. Upper surfaces of Smitt MCZ *Cupuladria biporosa* specimens, natural size. Fig. 32. Three of Smitt MCZ *Cupuladria biporosa* specimens, undersides, natural size. Fig. 33. View of underside of *Cupuladria biporosa* colony. Smitt MCZ # 145. Fig. 34. View of convex side of fragmented and regenerated *Cupuladria biporosa* colony. Smitt MCZ no. 14. Note serpulid tube attached to right side. Fig. 35. Top of *Cupuladria biporosa* colony. Smitt MCZ # 145. Two large vicarious vibracular chambers marked. Fig. 36. *Cupuladria biporosa* colony. Smitt MCZ # 145. Zooids and vibracula at edge of colony. Fig. 37. Underside of *Cupuladria biporosa* colony. Smitt MCZ no. 14. Shows pattern of extrazooidal calcification in square sectors.

Materials Examined: Smitt MCZ #3. *Cupularia stellata?* 1868. 2 miles S of Rebecca Shoal, 10 fms. Pourt. Smitt MCZ # 7. *Cupularia stellata?* Jan. 22, 1868. 3rd D[redging]. Smitt MCZ # 14. *Cupularia stellata?* May 20,1868. 4RM, 29 fms. Pourt. Smitt MCZ # 27. *Cupularia stellata.* 1868. Tortugas, Pourt. Smitt MCZ # 69. *Cupularia stellata?* Apr. 3, 1869. Cast No. 3, Off French Reef, 44 fms. Pourt. Smitt MCZ # 96. *Cupularia stellata?* March 21, 1869. Cast No. 8, Off Carysfort reef, 35 fms. Pourt. Smitt MCZ # 101. *Cupularia stellata?* March 31, 1869. Cast No. 1, Off Carysfort reef, 52 fms. Smitt MCZ #102. *Cupularia stellata?* January 18, 1869. Cast No. 3, SW of Tortugas, 60 fms., Pourt. Smitt MCZ #116. [No identification]. Jan. 15, 1969. Cast No. 4, S of Tortugas, 34 fms. Smitt MCZ # 136. Bryozoa. March 21, 1869. Cast No 7, Off Carys Fort reef. 40 [fms]. Smitt MCZ # 145. Bryozoa. May 8, 1869. Cast nos. 2 & 3, Off Alligator reef, 44 fms.

Description: Colonies free-living, lunulitiform, up to 16 mm in diameter, saucer shaped, with a convex upper surface covered by rows of radially arranged zooids, each with a distal interzoecial vibraculum, with an ear-shaped chamber and a long curved seta. In addition to these regularly budded vibracula, large vicarious vibracula, with scimitar-shaped setae occur in the ancestrular region at the peak of the colony or areas of regeneration (Fig. 35). The lower surface of the colony consists of extrazooidal calcification in a pattern of concentric rings of small square sectors, each with 1-6 indented pores (Fig. 37). According to Cook (1965b) 4-pored sectors are most frequent, but in inner rows, where calcification has proceeded further, more sectors have 2 pores (hence *biporosa*). Zooids are rhomboidal, the frontal membrane underlain laterally and proximally by a gently shelving granular-textured cryptocyst, its edges straight laterally and curved proximally. No ovicells. Embryos brooded in zooids.

Remarks: Canu & Bassler described *C. biporosa* from the Miocene Bowden Marl, Santo Domingo, Dominican Republic. Their description stressed its wide marginal zooids and ear-shaped vibracular chambers. After the initial description, however, the species was not reported until the work of Cook (1965b) whose examination of hundreds of specimens led her to recognize that many records of both fossil and Recent *C. canariensis* actually included a mixture of *canariensis* and *biporosa.* According to Cook (1965b), colonies of *C. biporosa* are generally smaller than those of *C. canariensis*, as are zooids. In *biporosa* the shelf of the cryptocyst also tends to extend out over the zooid body, so that the interior lateral wall pores are not visible from above (as they are in *canariensis*). The two species also differ consistently in basal surface characters (*biporosa* showing concentric rings and having square vs. rectangular sector outlines with fewer pores/sector), and in the presence of large vicarious vibracula in *biporosa* and their absence, at least in western Atlantic material, in *C. canariensis* (=*surinamensis* according to Cadée 1975).

Distribution: (Recent Western Atlantic): Cape Hatteras to Brazil, Caribbean, Gulf of Mexico. ? Also reported from tropical E. Pacific, California to Galapagos.

Cupuladria biporosa	Lz	Wz	Lo	Wo	Lav	Wav	Lvicavic	Wvicavic
N	18	18	12	12	18	18	12	12
MEAN mm	0.45	0.3	0.09	0.1	0.17	0.12	0.26	0.17
ST DEV mm	0.06	0.04	0.02	0.02	0.02	0.02	0.04	0.03
RANGE min	0.36	0.216	0.072	0.072	0.144	0.099	0.216	0.108
max	0.54	0.396	0.126	0.126	0.216	0.162	0.324	0.216

Cupuladria doma (d'Orbigny) 1853
Figs. 38-39 (Smitt MCZ #15)

Discoflustrella doma D'Orbigny, 1853: 561.

Cupularia doma Smitt, 1873: 15, pl. III, figs. 81-84; Canu & Bassler, 1923: 77, pl.1, fig. 18; pl. 15, figs. 1-5; 1928b: 64, pl. 6, figs. 2-5.

Discoporella doma Osburn, 1940: 374. Maturo, 1957: 41, fig. 48, 49; Cheetham & Sandberg, 1964: 1022, text-fig. 15; Shier, 1964: 621.

Cupuladria doma Gautier, 1962: 54; Cook, 1965b: 216, pl.1, fig. 7, figs. 2e, 3; 1968: 145; Prenant & Bobin, 1966: 314; Winston, 1982: 122, fig. 23; Winston & Håkansson, 1986: 13, figs. 25, 27, 29.

Material Examined: MCZ Smitt no.15. *Cupularia doma.* May 20, 1868. 4 RM, 29 fms. Pourt. VMNH no. 612.00. *Cupuladria doma.* Capron Shoal, near Buoy 10A, off S. Hutchinson Island, St. Lucie Co., Florida, J. E. Winston 9 Jul. 1998. VMNH. no. 2790. NOAA fishgear site, 7 miles off Fort Pierce, St. Lucie County, Florida, J. E. Winston, S. Reed, 03 Jul. 2002.

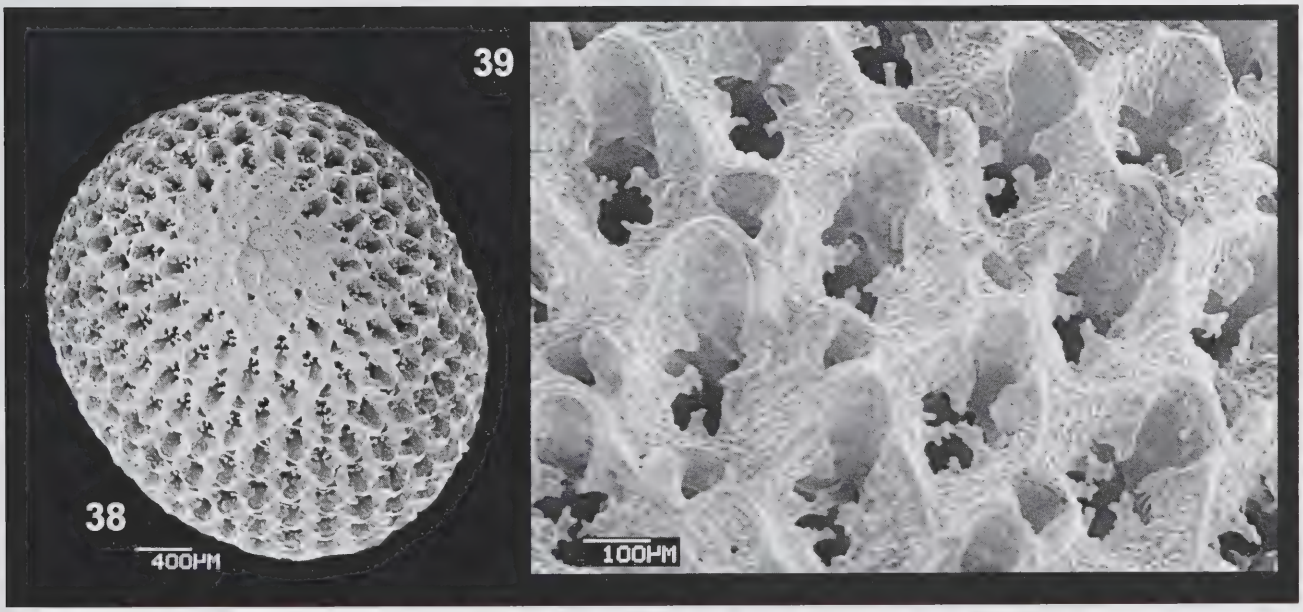
Description: Colonies lunulitiform, free-living on sandy substrata, shaped like solid, steep-sided, circular to ovoid domes, 4-6 mm in size when mature, pink to brownish red in life. The solid basal surface, glistening white in color when live, is made up of extra-zooidal calcification which may be flat to slightly convex, patterned with radiating grooves and ridges with a granular to tubulose calcification. Zooids are rhomboidal in outline, regularly arranged, with cryptocystal calcification surrounding a trifoliate opesia which is semi-circular to spade-shaped distally, irregularly denticulate proximally due to inward projections of granular cryptocyst. Distal to each zooid is an

interzooidal vibraculum with a strong, golden brown, slightly curved mandible. Peripheral vibracula are large, and, in still growing colonies, give the colony rim a scalloped edge. In mature colonies in which outward growth has stopped, there is a double row of vibracula, the adjacent zooids have become closed over and spaces between the vibracula filled in by additional calcification. Polypides with 11- 13 translucent pale pink tentacles. No ovicells. Pinkish orange embryos brooded in maternal zooids.

Discussion: Colonies of *C. doma* are easy to distinguish from the other cupuladriids occurring in the region by means of the lacy cryptocyst of zooids as well as the steeply conical colonies, and their solid, rather than concave, bases. Cook (1965b) gives a complete synonymy, including European and African records. Maturo's (1968) survey found *Cupuladria doma* to be the most common cupuladriid along the southeastern US coast, present at 271 stations and apparently evenly distributed across the entire continental shelf, making it an important component of sand bottom subtidal and shelf communities. Studies of the population biology of cupuladriids carried out on a Florida shoal (Winston & Håkansson1986; Winston 1988; Winston & Håkansson 1989) showed that, at least in this high energy environment, *C. doma* was much more abundant than *Discoporella*, the other species present. Larvae of *C. doma*, like those of other cupuladriids including *Cupuladria biporosa*, settle on a grain of sand and metamorphose into an ancestrular triad of zooids. The growing colony eventually completely overgrows the grain on which its founder settled, and develops its characteristic shape. *C. doma* colonies reproduce primarily by sexual reproduction; production of larvae occurs year-round. Although colonies were subject to both physical and biological disturbance, the percentage of colonies reproducing asexually (by fragmentation and regeneration) was low (<4%). Most damage and repair (to 59% of colonies) was to colony edges. Colonies initiated sexual reproduction at a small size (about 30 zooids). The ability to live exposed on the sand surface and to move through sediments by means of concerted action of the vibracula make it possible for these bryozoans to occupy a habitat hostile to most other bryozoans. In this environment fouling is a servere problem, and colonies may become fouled by organisms ranging from algae to other bryozoans. They counter this by periodically molting their outer cuticle. The frontal membranes and opercula of zooids, as well as the whole basal cuticle, is sloughed off to reveal a fresh cuticle beneath.

Distribution: Western Atlantic: Cape Hatteras to Florida, Gulf of Mexico and Caribbean. Also reported from western Africa as far south as Gabon and from the western Mediterranean (Cook 1965b, 1985).

Cupuladria doma	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.38	0.27	0.12	0.11	0.22	0.14
ST DEV mm	0.04	0.02	0.01	ERR	0.01	0.01
RANGE min	0.324	0.252	0.108	0.108	0.198	0.126
max	0.45	0.306	0.126	0.108	0.234	0.144



Figures 38-39. *Cupuladria doma* (d'Orbigny) 1853 (=*Discoflustrella doma* of Smitt 1873). Fig. 38. Entire colony. Smitt MCZ no. 15. Fig. 39. Zooids and vibracula. Smitt MCZ no. 15.

Genus *Discoporella* d'Orbigny, 1852

Discoporella depressa (Conrad) 1841
Figs. 40-43 (Smitt MCZ #17)

Lunulites depressa Conrad, 1841: 348.
Cupularia umbellata Smitt, 1873: p. 14, pl. III, figs. 75-80.
? *Cupularia umbellata* Verrill, 1878: 305.
Discoporella umbellata subspecies *depressa* (Conrad), 1841; Canu & Bassler, 1928b: 64; Hastings, 1930: 718.
Cupularia lowei Osburn, 1914: 194.
Discoporella umbellata Osburn, 1940: 374; 1947: 18; 1950: 113; Maturo, 1957: 41; Shier, 1964: 621; Cheetham & Sandberg, 1964: 1022. Rucker 1967: 824, Fig. 13g.
Discoporella umbellata subspecies *depressa* Cook, 1965a: 180, Pl.3, figs.2,4; Cadée, 1975: 328; Winston, 1982: 22, fig. 24; Winston & Håkansson, 1986: 14, figs. 26, 28, 30.

Material Examined: MCZ SMITT #17. *Cupularia lowei*? [attached tag - *Cupularia umbellata*]. Off W. bar, Cape Fear River, 7 fms. Pourt. 1868 (a very worn colony, with zooid frontal walls partially abraded). *Discoporella depressa*. VMNH no. 26.00. Capron Shoal, off S. Hutchinson Island, St. Lucie Co, Florida. J. E. Winston, 6 Sep 1989. VMNH no. 614.00. Capron Shoal, off S. Hutchinson Island, St. Lucie Co, Florida. J. E. Winston, 9 Jul 1998.

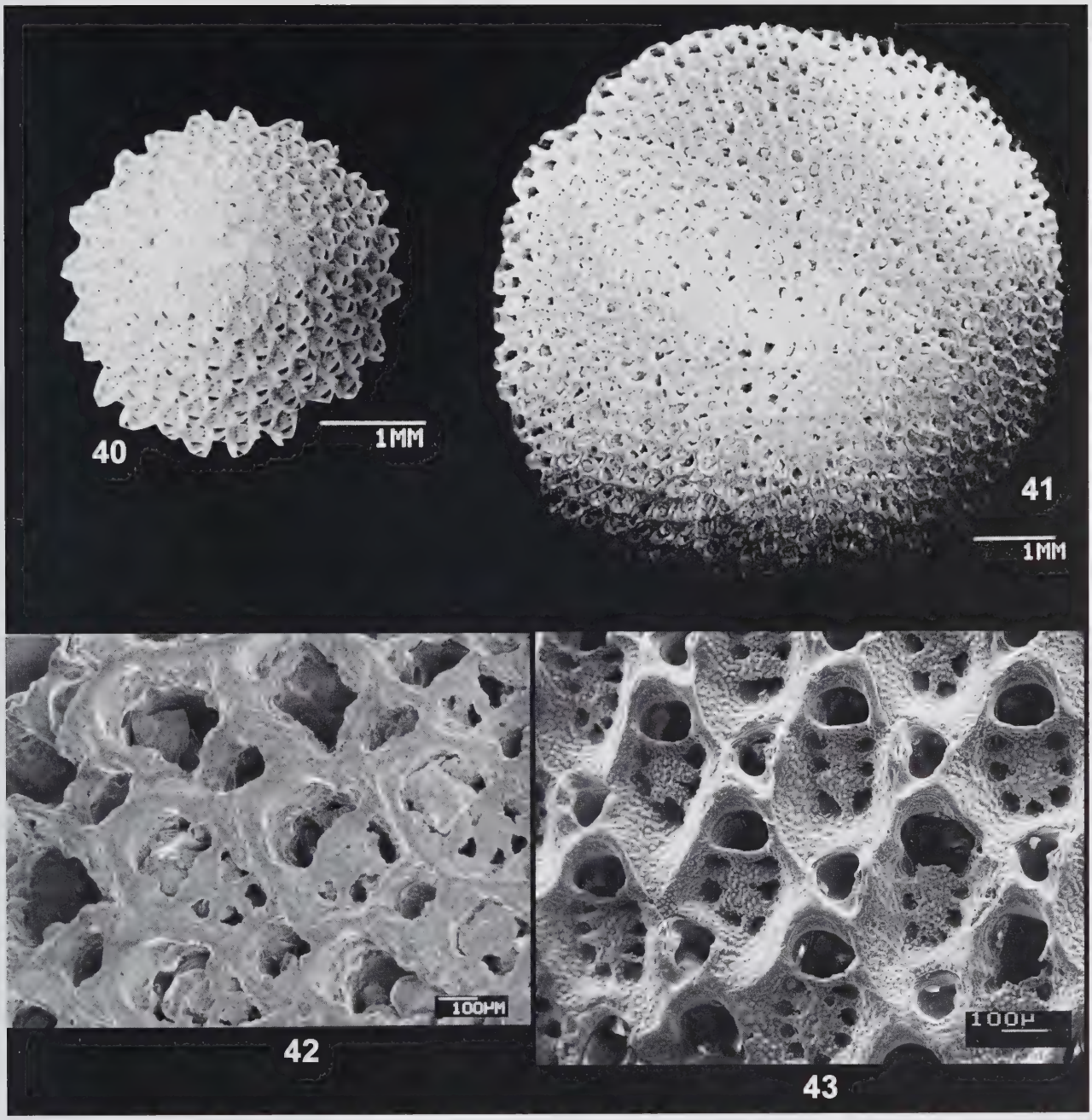
Description: Colony lunulitiform. Larvae settle on a sand grain, adults are free-living among grains and upon the sediment surface. Colony reddish brown, shaped like an inverted cup or saucer (up ro 9.5 mm in size), with a concave basal surface, marked by radial tuberculate ridges (Fig. 40). Zooids rhomboidal, regularly arranged. Frontal membrane underlain by a granular cryptocyst formed by fused spinous processes, the distal end containing an uncalcified, semicircular opesial opening, the proximal region punctured by about 6-8 small opesiules.(Fig. 43) Interzooidal vibraculum with a long curved mandible located at the distal end of each zooid. Rose pink polypides with 13 tentacles; mean lophophore diameter .453 mm. No ovicells; embryos internally brooded in zooids.

Discoporella depressa	Lz	Wz	Lav	Wav
N	6	6	6	6
MEAN mm	0.4	0.25	0.21	0.18
ST DEV mm	0.04	0.03	0.01	0.01
RANGE min	0.324	0.216	0.198	0.162
max	0.432	0.288	0.234	0.198

Discussion: Results of the study carried out at Capron Shoal, Florida by Winston & Håkansson (1989) showed that, at least in that shallow, high energy habitat, the larger flatter *Discoporella* colonies suffered more fragmentation than those of *C. doma*. Regenerated asexually produced colonies were more abundant than those produced by larvae and sexual reproduction occurred only in spring. *Discoporella* colonies were much less common than *C. doma* colonies and there was some indication that they preferred areas where the sediment contained more mud. This is supported by Cadée's finding of *Discoporella* as the most abundant cupuladriid species on muddy sediments of the Guyana shelf (Cadée 1975).

The work of Cook (1965a, 1965b) greatly clarified the complex history of the cupuladriids, an important component of soft sediment shelf communities since Miocene times. Cook chose to keep W. Atlantic forms as a subspecies of the European Miocene *Discoporella umbellata* Defrance 1823. Her own evidence showed that the number of opesiules between E. and W. Atlantic forms differs, and that "The wide zoecia, the nearly straight proximal edge of the opesia, with its two denticles, and the denticulate edge of the proximal vibracula opesia" are all features not found in the fossil and Recent species from the western Atlantic and eastern Pacific which have been separated as *D. umbellata* subsp. *depressa* (Conrad)"(Cook, 1965b: 180). As the synonymy above shows, later authors followed her lead in using subspecies *depressa* for Western Atlantic material. However, genetic studies on several bryozoan species (Maturo 1973, Jackson and Cheetham 1990) have now demonstrated clearly that small differences in skeletal characters do reflect species level differences. Those results suggest that the differences Cook described would probably now be judged to reflect species level differences. It seems preferable at this point to group the fossil and living Western Atlantic material together as a W. Atlantic species, *Discoporella depressa*, using Conrad's name, and keep the E. Atlantic material as *Discoporella umbellata*. However, the relationships between living and fossil species, as well as the biogeographic relationships of Recent species, still need much more work. There appear to be several species complexes, and it may take molecular genetic studies such as those being carried out on cupuladriids in the Gulf of Panama and Caribbean by Jackson and Dick to enable us to understand evolutionary and ecological relationships in the group.

Distribution: Tropical and subtropical Western Atlantic: Cape Hatteras to Florida, Gulf of Mexico, and Caribbean. Also reported from the tropical Eastern Pacific: Point Conception, California to Ecuador.



Figures 40-43. *Discoporella depressa* (Conrad) 1841 (=*Cupularia umbellata* of Smitt 1873). Fig. 40. Young *Discoporella despressa* colony, Capron Shoal, August 1984 [for comparison with Smitt specimen). Fig. 41. Entire colony. Smitt MCZ no. 17 (with dried tissue present). Fig. 42. Zooids and vibracula. Smitt MCZ no. 17 (with dried tissue present). Fig. 43. Zooids and vibracula of bleached Capron Shoal colony of *Discoporella depressa*, for comparison with Smitt material.

Superfamily Buguloidea Gray, 1848

Family Bugulidae Gray, 1848

Genus *Bugula* Oken, 1815

Bugula rylandi Maturo,1966
Figs. 44-46. (Smitt #115).

Bugula flabellata Smitt, 1872: 18, pl. V, figs. 48-52.
Bugula rylandi Maturo, 1966: 566, figs. 1, 9, 10.

Material Examined: Smitt MCZ # 115. Jan. 21, 1869. Cast No. 3, S. Of Rebecca Channel, 16 ½ fms. Pourt.

Description: Colony is rooted, erect, branching. Branches initially biserial, broadening to quadriserial at branch bifurcations. Zooids are elongate, tapering proximally, the frontal membrane taking up about three quarters of the frontal surface. The species has a 1:1 spine formula with one spine at the inner distal angle, sometimes curving inward over the frontal membrane and the outer distal angle is prolonged into a pointed spine. A bird's head avicularium, greater than a zooid width in length, with a decurved beak, is located between 1/4 and 1/3 of the way down the outer side of the frontal wall. Ovicells are cap-shaped, elevated above the spines, the membranous undersurface often showing (Fig. 44).

Discussion: The characters used to distinguish *Bugula* species include the growth pattern of the colony, the width of the branches, the way in which branching takes place (bifurcation type), and the number of distal spines on the inner and outer sides of the zooids, as well as the size, shape, and position of the bird's head avicularia. Smitt called his Floridan specimens *Bugula flabellata*. However, *B. flabellata* (Thompson in Gray, 1848) is a European species with zooids in 3-8 rows and a spine formula of 3:2. The branch fragments in the MCZ collection, like those Smitt illustrated, do not fit this description. They appear, instead to match the description of *Bugula rylandi*, described by Maturo in 1966 from the vicinity of Sapelo Island, Georgia (21.8 m). Osburn (1914, 1940) listed *Bugula flabellata* from the Tortugas and Puerto Rico, he gave no illustrations, but the description of the one Puerto Rican specimen at least, as having more than two spines, make it unlikely that he was dealing with the same species as Smitt. Marcus (19) described a very similar species from Brazil, *Bugula carvalhoi*, which also has a 1:1 spine formula, but, according to Maturo, *carvalhoi* also has a fan shaped colony form, type 4 vs. type 3 bifurcations, and more proximally positioned avicularia.

Distribution: Georgia to Florida Keys (at least).

Bugula rylandi	Lz	Wz	Lov	Wov	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.56	0.18	0.11	0.18	0.21	0.1
ST DEV mm	0.07	0.02	0.01	0.01	0.02	0.01
RANGE min	0.468	0.144	0.09	0.162	0.198	0.09
max	0.648	0.198	0.126	0.198	0.252	0.108

Figures. 44-46. *Bugula rylandi* Maturo 1966 (=*Bugula flabellata* of Smitt 1872) All illustrations. Smitt MCZ no. 115. Fig. 44. View of two branches, showing ovicells and avicularia. Fig. 45. Close up of zooids near branch bifurcation. Note spines. Fig. 46. Ovicells and avicularia.

Genus *Halophila* Gray 1843

Amended diagnosis: colony branching, biserial, zooids group into short internodes separated by inconspicuous joints. Zooids elongate, narrow proximally, much broader distally, with U-shaped opesial area. Operculum delicate. Ovicells present. Avicularia lacking.

Type species: Halophila johnstonae Gray, 1843: 292.

Discussion: In his 1909 work, *Morphological and Systematic Studies on the Cheilostomatous Bryozoa*, Levinsen included Gray's genus *Halophila*, listing it as having neither ovicells or avicularia. Ovicells were later identified in both Pacific (Harmer 1926, p. 449) and Atlantic (Canu & Bassler, 1928b: 42) material. However, Harmer, chose to put *H. johnstonae* back into *Bugula*. He felt that it and *B. longicauda* were "...derived from typical *Bugula*...." However, he also mentioned that both species have joints. The family placement of *Halophila* is still unclear, as some authors have used Bugulidae only for unjointed members of the superfamily Buguloidea (e.g., Hayward & Ryland, 1998: 207), but its affinities are clearly with *Bugula* and *Caulibugula*.

Halophila antillaea new species
Figs. 47-52. (Smitt MCZ #125)

Halophila johnstoniae Smitt, 1872: 17, pl. V, fig. 47. NOT *Halophila johnstonae* Gray 1843: 292.
Halophila johnstoniae Canu & Bassler, 1928b: 42, pl. 4, fig. 12.
Halophila johnstoniae Osburn, 1947: 23; Winston, 1986: 7, fig. 5.

Holotype: VMNH no. 3176.00, Rio Bueno, Jamaica, 22m, Sept. 1981, J. E.Winston.

Diagnosis: Halophila having colonies colored a dark green in life and remaining blackish green or grayish when dried.. Zooids alternating biserially, with their proximal portion parallel to branch growth and their distal portion directed outward at a 50 degree angle.

Material Examined: Smitt MCZ #125. [*Halophila* not mentioned on label] *Vincularia margaritacea, Cellularia pusilla, Canda retiformis* [along with *Cellaria bassleri* and two small tubuliporid colonies]. Jan. 16, 1869, Cast No. 13, W. of Tortugas, 68 fms. Pourt. NMNH. *Halophila johnstoniae*, Osburn Collection, Acc. #208837. *Bugula johnstoniae* Hancock A18-39. *Bugula (Halophila) johnstoniae* Albatross Sta. 2411, Gulf of Mexico, W. of Florida, 24 fms. *Bugula (Halophila) johnstoniae*. Albatross Sta. 2413, Gulf of Mexico, S. W. Charlotte Harbor, FLA, 24 fms. *Bugula johnstoniae* "ovicells" "Blake" 77-78, St. 12, 36 fms., 24° 34' N, 83° 16' W. BCZ [MCZ], lot 112. USNM 10184. *Halophila*. Gulf of Mexico. Alb. D2373. USNM no. 9338. *Halophila johnstoniae*. Cumberland Isl. Busk Collection.

Etymology: antillaea = from Antillae, a Latinization of the Antilles, or West Indies, so named to distinguish this Caribbean and West Atlantic species from the Pacific species *H. johnstonae*.

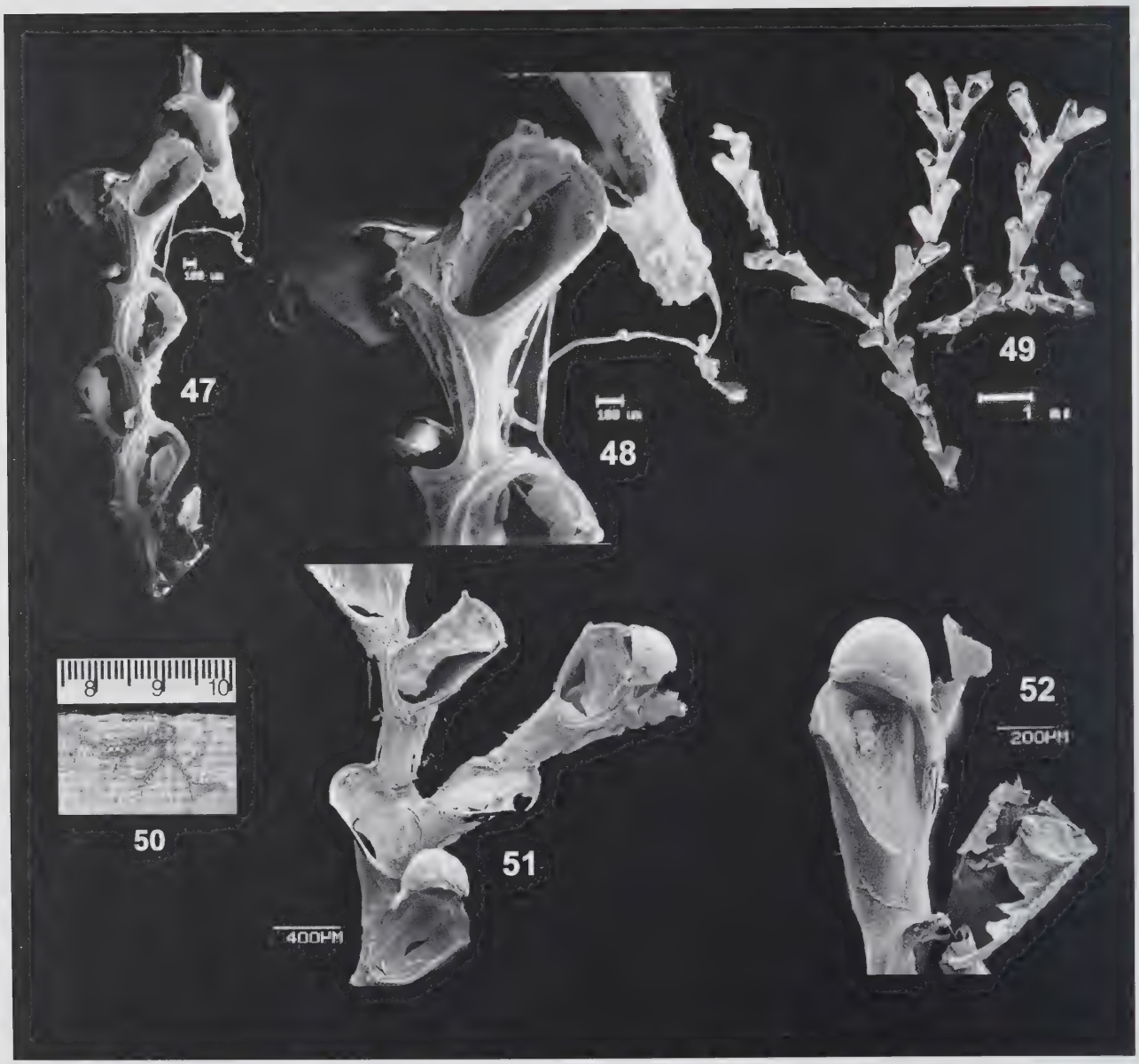
Description: Colony erect, biserial. In life the dark green, flexible, lightly calcified branches are attached loosely to the substratum by slender rhizoids projecting from basal surfaces of branches at colony bases and at other points along the branches. The large zooids alternate biserially on the branches, their elongate proximal portion parallel to branch growth, but their scoop-shaped distal opesial portion extends outwards at about a 50° angle, giving a coarsely serrated, zig-zag appearance to colonies viewed with the unaided eye. (Fig. 50). The distal end of the scoop is closed by a slanted semi-circular operculum (Fig. 51). Some cuticle-covered zooids appear to have very short spines; these are actually short chitinous points extending from the distal edge of the lateral walls; they are not calcified, and do not appear on skeletal material. The opesia is U-shaped with a narrow, faintly beaded cryptocyst. A sinuate ridge of calcification outlining the opesia of sequential zooids is apparent, especially in skeletal specimens (Fig. 48). Zooids are grouped into short internodes, separated by inconspicuous joints. There are no avicularia. Ovicells, not present in the one small MCZ fragment, but illustrated here in a Jamaican specimen (Figs. 51, 52) are prominent and hemispherical, with a proximally thickened rim. They are attached obliquely to the inner distal angle of the zooids.

Halophila antillaea	Lz	Wz	Lopesia	Wopesia
N	5	5	5	5
MEAN mm	1.18	0.49	0.63	0.42
ST DEV mm	0.08	0.02	0.05	0.02
RANGE min	1.08	0.468	0.576	0.396
max	1.296	0.522	0.702	0.45

Discussion: Smitt (1872) identified one fragmentary specimen from Florida as belonging to the *Halophila johnstoniae* (sic) described in 1843 from New Zealand by Gray. The specimen in the MCZ collection is another small branch fragment. Apparently this specimen was overlooked by Smitt, as it is not noted on the specimen label. Since Smitt's time the name *Halophila johnstonae* or *-iae* has been used for W. Atlantic, Caribbean and Gulf of Mexico material, despite the morphological differences pointed out by Smitt, "...the loss of the angular spine at the upper outer angle and the more marked rib along the margins of the proximal parts of the zooecia....(Smitt, 1872: 17). Another difference appears to be in in coloration. According to Gray's original description, *H. johnstonae* is "horn coloured". Harmer mentions Pacific material (not all from New Zealand) being "grey". Busk (1852), called his New Zealand and Bass Strait specimens "light grey or lead color". Caribbean

specimens are dark green in life, and greenish-black or gray when dry. There are additional morphological differences, particularly the much sharper angle at which the distal opesial opening projects. This is about 50° in Antillean material vs. 70-75° in Pacific material (as measured on Busk, 1852: pl. XXX, fig.3 and Harmer, 1926: pl. XXXI, fig. 21). Ovicells of Pacific specimens were illustrated by Harmer (pl. XXX, fig.14, pl.XXXI, fig. 21). They are subglobular and are attached horizontally to zooids, rather than being attached at an oblique tilt as in the Caribbean material. In addition, the Pacific species has distinct spines, and the Atlantic-Caribbean species shows the "rib" described by Smitt. However, the two species are similar in enough ways to still warrant their inclusion in a separate genus, distinct from *Bugula*. There may be a third species in the Gulf of Mexico. USNM material from Alb. STA. 2405 and 2411 have *Halophila* specimens with more delicate and sharply triangular zooids with a tan coloration.

Distribution: Florida, Caribbean, and Gulf of Mexico.



Figures 47-52. *Halophila antillaea*. Fig. 47. Colony fragment. Smitt MCZ # 125. Fig. 48. Close-up of partially skeletal zooids. Smitt MCZ # 125. Fig. 49. Portion of *Halophila antillaea* to show branching pattern. BL1-10, Bluefields, Jamaica, 1979, Fig. 50. Life size dried colony of *Halophila antillaea*, showing dark color against light colored panel, Rio Bueno, Jamaica, 1980, VMNH no. 3176. Fig. 51. *Halophila antillaea*, ovicelled branches, Pear Tree Bottom, Jamaica, 20 m, PTB20-2-5, Fig. 52. Close-up of ovicelled zooid, same colony. Pear Tree Bottom, Jamaica, 20 m, PTB20-2-5.

Family Scrupocellariidae Levinsen, 1909

Genus *Canda* Lamouroux, 1816

Canda retiformis Pourtalès, 1867
Figs. 53-56 (Smitt MCZ#168)

Canda retiformis Pourtalès, 1867: 110.
Caberea retiformis Smitt,1872: 16, pl. V, figs. 43-46.
Scrupocellaria retiformis Canu & Bassler, 1928b: 43.
Canda retiformis Marcus, 1955: 290, figs. 38-40. Rucker 1967:825, Fig. 12h.

Material Examined: Syntypes Smitt MCZ# 167. *Canda reticulata* [= *Canda retiformis*] May 29 [1867] off Chorrera [Cuba], 270 fms. Smitt MCZ # 168. *Canda retiformis*. Off Havana. 270 fms. [1867]. OTHER MATERIAL: Smitt MCZ #. 125. [Not identified– small fragments, together with *Turbicellipora margaritacea* and other species]. Jan.16, 1869. Cast No. 13, W. Off Tortugas, 68 fms. Pourt.

Description: The colony is rooted, erect, branching and fan-like, branches connected by tubular cross-radicles (Figs.53-54). Branches are square in cross-section with zooids on two adjacent sides and vibracular chambers on remaining sides. Zooids are sub-rectangular, with rounded distal edges, and slightly curved in alternating directions, so that the branch has an irregular zig-zag appearance (Fig.45). The opesia is ovoid, covering the distal 2/3 to 3/4 of the zooid frontal surface, a granular cryptocyst fills in its proximal portion. Two distal spines occur on autozooids, three (two inner) on ovicelled zooids, and one more proximal spine, located about 1/3 of the way down the inner frontal wall, is modified as a small, symmetrically developed scutum. Vibracula with short curved setae are found on the reverse sides of the branches. Ovicells are globose, with a central, elliptical, less-calcified area. Another membranous or less calcified area is apparent on top of the ovicell (Fig. 56), but there is no sessile avicularium in that position as in *C. simplex*.

Discussion: This species was named and briefly described by Pourtalès (1867), described in more detail by Smitt (1872) and reported by Canu & Bassler (1928b) from the Gulf of Mexico, Florida, and off Cuba. It appears to be much less widely distributed than the common Caribbean reef species, *Canda simplex*, and it apparently occurs in deeper water (68-270 fm, vs. the 4-10 fms. depths reported for *C. simplex* by Humann & Deloach (2002). The species has been reported from other parts of the world, e.g. Zanzibar, Ceylon, Seychelles, but according to Harmer (1926), these occurrences refer to *Canda foliifera*, a species which shares with *C. retiformis*, the presence of a scutum, the 1-1 and 2-1 distal spine formula, and the vestigial nature of the ovicell avicularium. However, *C. foliifera* has comparatively short, stout zooids, and the scutum is asymmetrically developed, leaf-shaped, and covers more of the opesiar area.

Pourtalès (1867: 106) states that "The next casts were obtained off Havana in 270 fathoms on May 24th and 29th, on both days as nearly as possible on the same spot, as the little that was obtained at the first date had given much promise." The label on Smitt MCZ # 167 says it was collected on the 29th, so is from the second sample listed, but #168 has no information on month or day of collection.

Distribution: Gulf of Mexico, Florida, Cuba, Brazil.

Canda retiformis	Lz	Wz	Lo	Wo	Lov	Wov	Lscut	Wscut	Lopesia	Wopesia	W radicle
N	12	12	6	12	3	3	12	12	12	12	8
MEAN mm	0.49	0.2	0.08	0.1	0.43	0.35	0.18	0.06	0.32	0.13	0.07
ST DEV mm	0.12	0.02	0.02	0.02	0.02	0.01	0.05	0.02	0.05	0.02	0.01
RANGE min	0.36	0.18	0.054	0.072	0.414	0.342	0.126	0.036	0.234	0.108	0.054
max	0.63	0.234	0.09	0.126	0.45	0.36	0.252	0.09	0.414	0.162	0.081

Genus *Scrupocellaria* van Beneden 1845

Scrupocellaria pusilla (Smitt) 1872
Figs. 57-62. (MCZ Specimen #100)

Cellularia pusilla Smitt, 1872: 13, pl. V, figs. 32-34.
Scrupocellaria cornigera Osburn, 1914: 191 (In part, acc. to Osburn, 1940: 386).
Scrupocellaria pusilla Osburn, 1940: 385; Winston, 1986: 10, figs. 12-14.

Material Examined: Syntype. *Cellularia pusilla* Jan. 16, 1869. Cast No. 13. W. Off Tortugas, 68 fms. Pourt. OTHER SPECIMENS EXAMINED: NMNH, Osburn Collection, P. R. STA. 2367, 2353.

Description: The colony is erect, branching and delicate, with zooids in two series. Zooids are elongate, slightly curved and tapering proximally, with an oval opesia surrounded by a narrow border and occupying only about a third of the frontal surface. Two or three spines are found at the outer distal angle of the zooid and one or two at the inner angle. The scutum is small, paddle-shaped and symmetrically developed. There are basal vibracula with curved tear-drop shaped chambers (Fig. 61). Lateral avicularia are small, with a deep triangular body cavity and a triangular mandible. Osburn (1940) described, but did not illustrate very large frontal avicularia "elongate spatulate and straight with a decurved tip" as present in some of his Puerto Rico material. They were usually found

Figures 53-56. *Canda retiformis* (Pourtalès), 1867. All Syntype. Smitt MCZ no. 168. Fig. 53. Portions of two branches with connecting radicles. Fig. 54. Close up of branch, note curled vibraculum, lower right. Fig. 55. Unbleached zooids and vibracula. Fig. 56. Close-up of ovicelled zooid.

on the axial zooid below a branch bifurcation. No frontal avicularia occur in the MCZ material. No ovicells are present in the MCZ specimens (perhaps all branch fragments from one colony), and none were described or figured by Smitt. According to Osburn (1940), the ovicells of *S. pusilla* are hemispherical, with scattered pores.

Discussion: Harmer (1926) synonymized this species with *Scrupocellaria spatulata* (D'Orbigny) but Osburn (1940) pointed out differences in size and placement of avicularia structure that make this synonymy unlikely.

Distribution: Florida (Tortugas) and Caribbean, a reef-associated species.

	Lz	Wz	Lo	Wo	Lopesia	Wopesia	Lav	Wav	Lscut.	Wscut
N	6	6	6	6	6	6	6	6	6	6
MEAN mm	0.57	0.15	0.06	0.1	0.21	0.11	0.08	0.06	0.11	0.06
ST DEV mm	0.07	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01
RANGE min	0.504	0.144	0.054	0.072	0.18	0.09	0.072	0.054	0.108	0.054
max	0.666	0.162	0.072	0.108	0.216	0.144	0.09	0.072	0.126	0.072

Scrupocellaria regularis Osburn (1940)
Figs. 63-68 (Smitt MCZ #163)

Cellularia cervicornis Smitt, 1872: 14, pl. V, figs. 35-38.

Scrupocellaria regularis Osburn, 1914: 192 (in part, acc. to Osburn, 1940: 386); Osburn, 1940: 384; Osburn, 1950: 144; Cheetham & Sandburg, 1964: 1025, figs. 20-21; Shier, 1964: 622; Rucker 1967: 825, Fig. 13a, b; Winston, 1982: 127, fig. 54.

Material Examined: Smitt MCZ # 38. *Cellularia cervicornis*. 1868. Off W. bank, Cape Fear River, 7 fms. Smitt MCZ # 40. "*Cellularia cervicornis* Busk" specimen in alcohol. [on printed 1868 label, but locality data completely faded]. Smitt MCZ # 163. *Cellularia cervicornis*. No locality or other label data. NMNH., Osburn Collection: P. R. STA. #2347, P. R. STA "off mouth of Guanica Harbor". Two specimens from Tortugas, Fl. (no #s) and one specimen from "Castle Harbour, Bermuda, May 9, 1936, 20 feet, S. R. Williams. VMNH no. 2856.01. *Scrupocellaria regularis*. Spoil site no.#2, off S. side of Fort Pierce Inlet, St. Lucie Co., Florida (27°29.40' N, 80°12.12'W), J. E. Winston and D. Pawson, 31 Jul 2002. VMNH no. 742.00 Walton Rocks, S. Hutchinson Island, St. Lucie Co., Florida, J. E. Winston, 09 Apr 1999.

Description: The colony is erect, branching, and biserial, the zooids arranged along the branch segments in two very regular series (Fig. 63), an uncalcified joint beginning each new segment at every bifurcation. The colony is attached to the substratum by chitinous rhizoids. Zooids are relatively short and wide, with opesia taking up half or more of the frontal surface. Opesiae are oval in shape, a smooth border of calcification surrounding the proximal portion. Four to five spines occur at the outer distal angle and two spines at the inner angle. The most proximal inner spine is modified as a scutum. The scutum is paddle shaped and asymmetrical, its inner edges coming to a sharp point (Fig. 64). Lateral avicularia with triangular mandibles and serrated rostra are found on lateral walls at the operculum level. Most zooids also have a frontal avicularium, similar in size and shape, developed just below the proximal end of the opesia and angled obliquely toward the inner side of the zooid, abutting the opesia of the adjacent zooid. (Fig. 66). Basal vibracular chambers (Figs 67-68) are large and triangular, with the septal groove oblique to the branch angle. Ovicells are helmet-shaped, with scattered round or oval pores (Figs. 64-65).

Discussion: Osburn (1940) pointed out that the species illustrated by Smitt was not the *Scrupocellaria cervicornis* of Busk (1852) and gave it a new name: *Scrupocellaria regularis*. It appears to be common in shallow water in Florida and the Gulf of Mexico. Living colonies in the Indian River area of Florida form robust, stiff, pinkish tan fan-shaped colonies, with red embryos (Winston 1982). MCZ specimens (#163), although long dry, still show the characteristic fan shaped branching pattern.

It is important to note that several similar species may occur in the tropical western Atlantic region. *Scrupocellaria cornigera* was collected from 270 fms, described minimally by Pourtalès (1867) and redescribed and figured by Smitt (1872: 14). No material of the species is in the MCZ collection studied here, but Smitt's illustration (Fig. 35) shows that in *S. cornigera* the scutum almost completely fills the opesiar area, whereas in *S. regularis* some frontal membrane is visible around the scutum, especially distally (Fig. 64). In Smitt's illustration, the vibracular chamber of *S. cornigera* is also small relative to zooid size, and the setal groove longitudinally directed. Marcus (1937) described what he called *Scrupocellaria cornigera* from Brazil. Brazilian colonies, from shallow water, are delicate, and yellowish white in life, with orange embryos. The vibracular chamber is small, but the setal groove is transverse, oriented horizontal to branch growth direction (Marcus, 1937: Estampa XI, fig. 25). Fransen (1986) described *Scrupocellaria carmabi* from Curaçao, as having transverse setal grooves, but differing from Marcus's *S. "cornigera"* in details of the branch bifurcations.

Distribution: Cape Hatteras to Florida, Caribbean, and Gulf of Mexico.

	Lz	Wz	Lopesia	Wopesia	Lov	Wov	Lav	Wav	Lscut	Wscut
N	18	18	18	18	18	18	18	18	18	18
MEAN mm	0.37	0.22	0.22	0.15	0.15	0.19	0.08	0.05	0.15	0.11
ST DEV mm	0.07	0.02	0.03	0.02	0.01	0.02	0.02	0.02	0.03	0.02
RANGE min	0.234	0.18	0.18	0.126	0.126	0.162	0.054	0.036	0.108	0.072
max	0.468	0.252	0.27	0.18	0.18	0.216	0.108	0.099	0.216	0.144

Superfamily Microporoidea Gray, 1848

Family Microporidae Gray, 1848

Genus *Micropora* Gray, 1848

Micropora acuminata, new species
Figs. 69-72 (Smitt MCZ #26)

Micropora coriacea Smitt, 1873: 13, pl. III, fig. 74; Canu & Bassler, 1928b: 62, text-fig. 8e; Osburn, 1940: 373; 1947: 17; Marcus, 1949: 16, fig. 19; 1955: 285; Winston, 1982: 125, fig. 39.
NOT *Flustra coriacea* Johnston, 1847: 349.

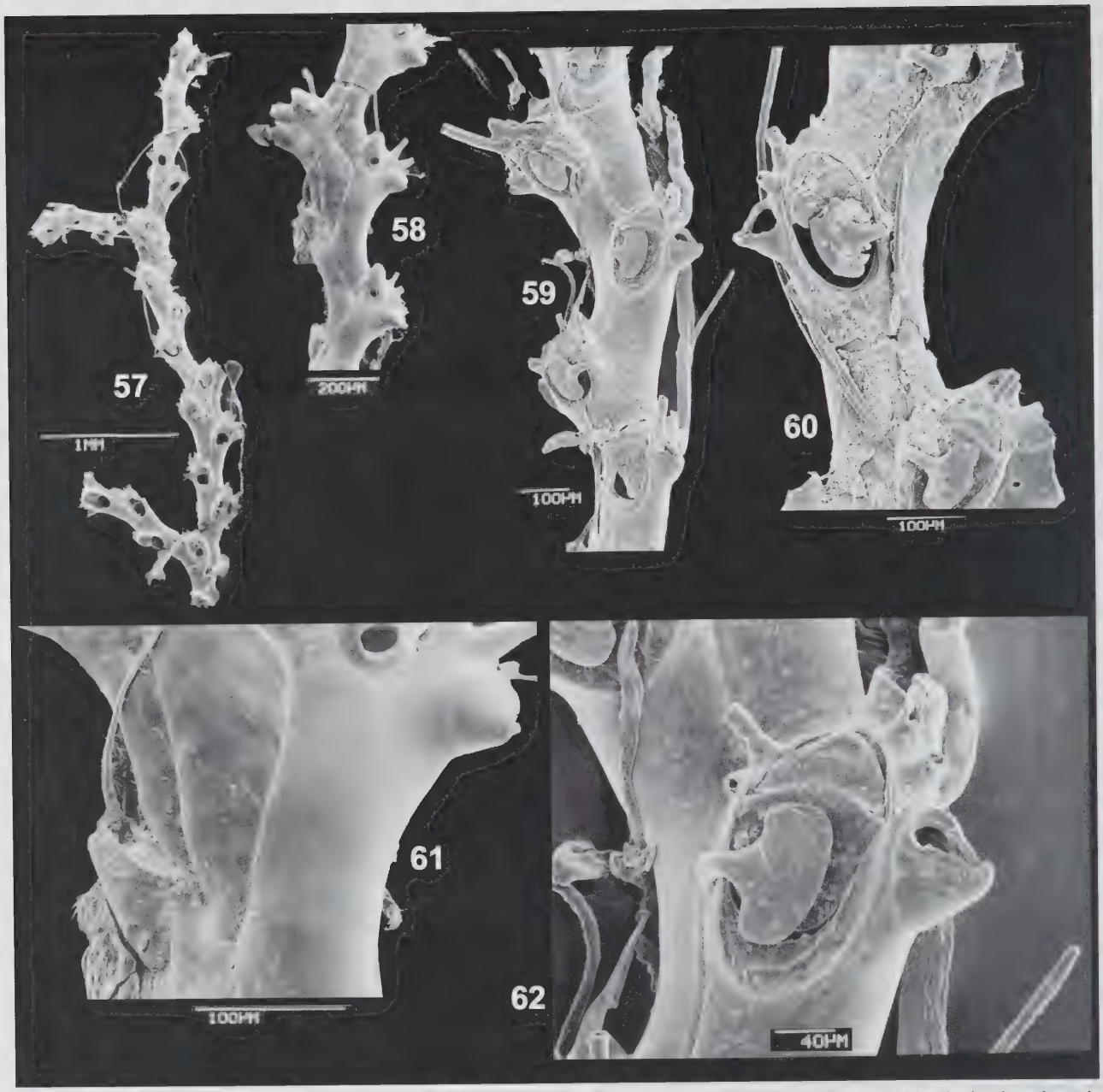
Holotype: Smitt MCZ # 141. *Micropora coriacea* [=*Micropora acuminata*] [with] *C. tuberosa.* April 21, 1869. Cast No. 1, off Key West, 135 fms. Paratypes: AMNH no. 593. VMNH no.

Diagnosis: Micropora with small zooids, paired raised distal tubercles on either side of the orifice, and a relatively small ovicell with a ridge ending in a small sharp point.

Material Examined: Smitt MCZ # 26. *Micropora coriacea.* May 6, 1868. Cast No. 7 [off American Shoal], 98 fms. USNM [no cat.nos, Acc. No. 10145] *Micropora coriacea* Alb. Stat. 2639. Straits of Florida, 25°4'50" N, 80°15'10" W, 56 fms. *Micropora coriacea.* Alb. Stat. 2405, 28°45' N, 85°02' W, 30 f.

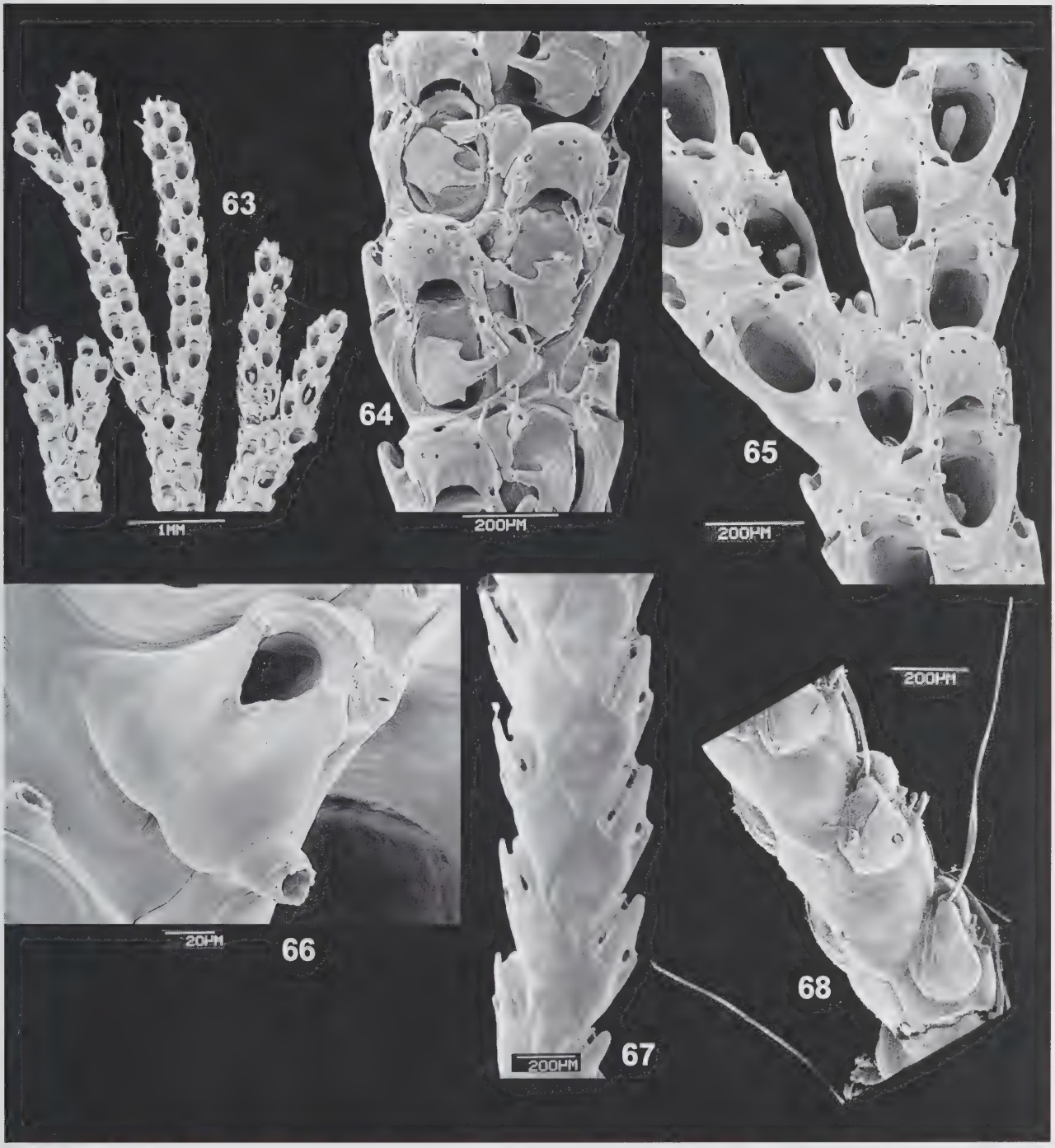
Etymology: The species name is from the Latin adjective acuminatus = pointed, sharpened, for the small sharp point in which the ovicell ridges end.

Description: Colony encrusting on dead shell, coral rubble, stone, etc. Zooids, oval distally, sharp cornered proximally, variable in size, separated by a distinct shallow groove. Two distal and two lateral pore chambers may be seen in zooids at the colony edge (Fig.69). Frontal membrane underlain by a



Figures 57-62. *Scrupocellaria pusilla* (Smitt) 1872. All Syntype. Smitt MCZ Specimen no. 100. Fig. 57. Unbleached colony branch fragment at low magnification. Fig. 58. Abfrontal side of branch. Fig. 59. Zooid arrangement. Fig. 60. Close-up of zooids showing scuta, avicularia and spines. Fig. 61. Close up of abfrontal surface showing avicularian chamber and seta. Fig. 62. Close-up of a single zooid.

beaded cryptocyst which is penetrated by about 26-36 small pores. Orifice a narrow D-shape, small relative to zooid size, and smoothly calcified all around the rim (although on its proximal edge the adjoining beaded cryptocyst may make it appear serrated). On either side of the orifice are raised, curving marginal "shoulders"with bosses or tubercles of smooth calcification. Just below them on each side of the frontal surface below the orifice is an opesiule (Figs.70,71). Ovicell sub-immersed, closed by the zooid operculum, with a beaded imperforate outer cryptocystal covering, and an inner layer of smooth calcification, meeting in a ridge which curves upward from the lower edge of the ovicells to a sharp triangular peak in its center. Florida specimens (Winston 1982) were reproductive in February. No avicularia persent in the specimens in the MCZ collection. Smitt's illustration (his fig. 74) shows small interzooidal avicularia located just above zooid orifices, each with a small triangular mandible set at a diagonal in the avicularian chamber.

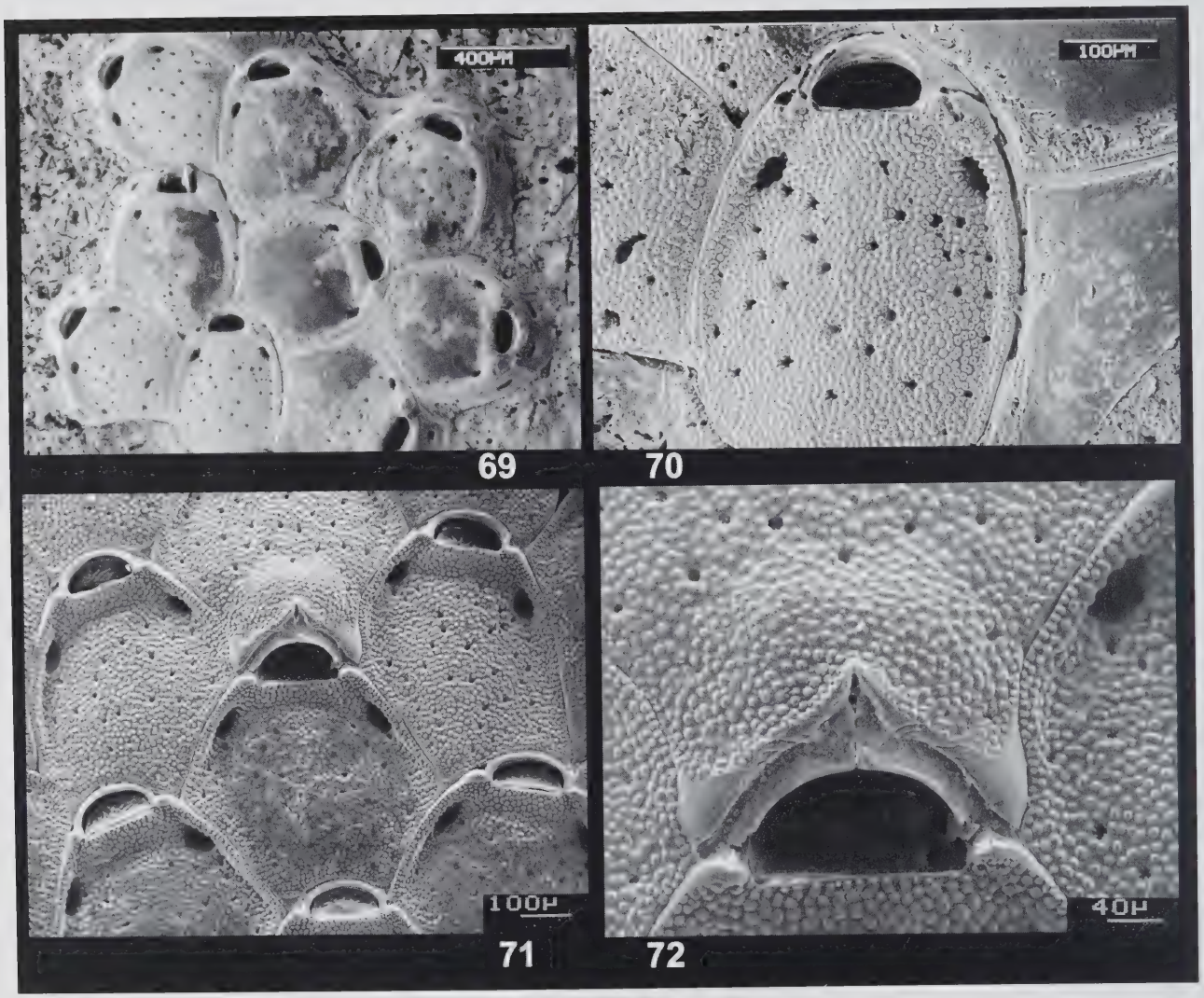


Figures 63-68. *Scrupocellaria regularis* Osburn (1940) (= *Cellularia cervicornis* of Smitt 1872). All Smitt MCZ no. 163. Fig. 63. Portion of colony fragment, showing branching pattern. Fig. 64. Unbleached zooids, showing scuta, and seta of a vibraculum. Fig. 65. Bleached zooids, showing skeletal morphology. Fig. 66. Close up of frontal avicularium. Fig. 67. Abfrontal surface of branch showing vibracular chambers. Fig. 68. Another view of vibracular chambers and setae.

	Lz	Wz	Lo	Wo
N	12	12	12	12
MEAN mm	0.67	0.54	0.09	0.15
ST DEV mm	0.09	0.04	0.01	0.01
RANGE min	0.56	0.46	0.081	0.14
max	0.864	0.594	0.1	0.18

Discussion: *Micropora coriacea* has at one time or other been recorded everywhere from the polar regions to the tropics and at depths ranging from the intertidal to over 800 m. Once considered to be a single extremely eurytopic species, more recent studies using SEM have shown consistent differences in skeletal characters of populations from different regions, and several additional species have been described. Cook (1985) described *Micropora robusta* from Ghana and Senegal amd noted that "The specimen from Florida figured by Smitt (1873: 13, pl.3, fig. 74) greatly resembles *M. robusta*, differing principally in the smaller size of the zooids, the raised distal tubercles, and the small ovicells." The African specimens do not have the pointed tip to the ovicell ridge which is the most characteristic feature of western Atlantic material, and which shows clearly in Smitt's illustration as well as in those of Marcus 1949 and Winston 1982. On the basis of these differences it seems preferable to give Smitt's species a different name.

Distribution: Cape Hatteras to Brazil, Straits of Florida, Gulf of Mexico, and Caribbean. Subtidal to shelf depths (7-218 m) on hard substrata.



Figures 69-72. *Micropora acuminata* n. sp. (=*Micropora coriacea* of Smitt 1873). Fig. 69. *Micropora acuminata* n. sp., young colony, partially bleached colony on substratum. Smitt MCZ no. 26. Fig. 70. *Micropora acuminata* n. sp. Zooid morphology, young autozooid. Smitt MCZ no. 26. Fig. 71. *Micropora acuminata* n. sp. Mature Indian River area colony with ovicelled zooid for comparison with Smitt specimen. AMNH no. 593 (Fig. 39 of Winston 1982). Fig. 72. *Micropora acuminata* n. sp. Close-up of ovicell of same Indian River area zooid, note sharp central triangular peak. AMNH no. 593.

Family Steginoporellidae Bassler 1953

Genus *Steginoporella* Smitt 1873

Steginoporella magnilabris (Busk) 1854
Figs. 73-75 (Smitt MCZ #97).

Membranipora magnilabris Busk, 1852: vi (explanation of pl. LXV), pl. LXV, fig. 4; 1854: 62 (part), 113.

Steginoporella elegans Smitt, 1873: 15, pl. IV, figs. 96-101; Verrill, 1900: 594. NOT *Eschara elegans* (Milne-Edwards, 1836: 337, pl. 12, fig. 13).

Steganoporella magnilabris Osburn, 1914: 196; 1940: 375, 1947: 18; Canu & Bassler, 1923: 63, pl. 14, figs. 12,13; 1928b: 64, pl. 7, figs. 8-10, pl. 32, fig. 6; Marcus, 1955: 284, Estampa 2, fig. 25; Cook, 1964a: 53, pl. 1, fig. 4, fig. 2; 1968a: 153; 1985: 108; Long & Rucker, 1970: 19, figs. 2, 6; Powell, 1971: 769.

Steginoporella magnilabris. Shier, 1964: 618; Winston, 1984: 10, fig.18; Cook, 1985: 108, pl. 12 D.

Material Examined: Smitt MCZ # 18. *Steginoporella elegans* .March 13, 1868. East Key, 13 fm. Smitt MCZ # 46. *Steginoporella elegans* . Jan. 21, 1868. 1 D[redging], 17 fm. Smitt MCZ # 97. *Steginoporella elegans*. Jan. 1869, Florida [W. Of Tortugas?] 35-36 fm. Pourt. Smitt MCZ # 148. *Steginoporella elegans*. May 11, 1869, Cast no. 1, off Conch reef, 60 fms. VMNH no. 2604.00. *Steginoporella magnilabris*. Spanish Anchor site, off Palm Beach, Palm Beach Co., Florida, D. and M. Littler, 15 July 1999. VMNH no.3178.00. Outer Ridge, Carrie Bow Cay, Belize, J. E. Winston, 27 Oct. 1984.

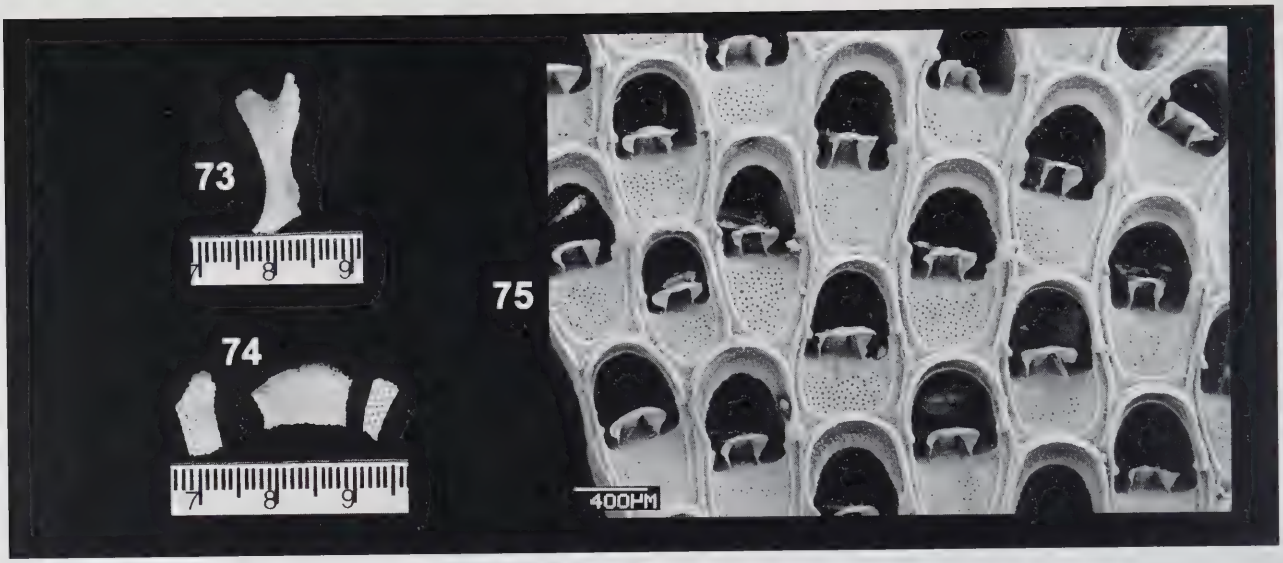
Description: Colonies are encrusting to tubular or foliaceous on substrata ranging from algae to corals; the large zooids, outlined by whitish lateral walls, have a distinctive snakeskin texture. Colony color pearly pinkish red to red in actively growing regions to brownish in senescent portions. Zooids are dimorphic, mostly of the smaller A-zooid type, with larger B-zooids interspersed. Zooids are subrectangular, with raised lateral margins and a sharp edged curved distal rim, forming a horseshoe shaped shelf with distinct proximal condyles, on which the large chitinous opercula rest. The proximal half of the frontal membrane is underlain by a porous cryptocyst which dips sharply downward from the proximal margin, then rises again to form a sharply bent shoe-tongue shaped polypide tube separated by deep notches from the lateral walls. The semicircular operculum of A-zooids is reinforced by an inverted U-shaped sclerite and bordered by rake-like chitinous teeth. The larger more rounded opercula of B-zooids have an inverted Y shaped sclerite and larger marginal teeth. They usually also have a crescent-shaped expansion of porous cryptocyst below the distal rim. No ovicells. Red embryos brooded in zooids.

Discussion: Smitt pointed out how much this species differs in appearance when the cuticle and brownish thumbnail shaped opercula are present (as in living or dry material), from the skeletal material, in which the polypide tube is the most apparent feature. However, he apparently thought his species was *Eschara elegans* (Milne-Edwards 1836). Many specimens from Florida waters grow free and eschariform from algal substrata, however, *Steginoporella magnilabris* is also found in cryptic coral reef and hard-ground communities where it commonly forms encrusting sheets [see color photograph, p.253 in Humann & DeLoach 2002, for example].

According to Cook (1964a) and Pouyet & David (1979a, 1979b) the species is cosmopolitan in tropical and subtropical waters. Busk's original description (1854: 62, pl. LXV, fig. 4) gave two localities, "Abrolhos Islet (Atlantic)" (= Abrolhos Archipelago, about 70 km off the coast of Bahia, Brazil), and Algoa Bay (South Africa). His illustration shows a specimen with intact cuticle and opercula, but there is no information on whether the figure is of Brazilian or South African material. Based on what we now know of bryozoan genetics, it seems unlikely that the distribution of this species, with its lecithotropic non-feeding larvae, is as cosmopolitan as has been claimed. Cook's Figure 2 shows considerable variation in opercula of A and B zooids from various sites, including an operculum from Busk's Abrolhos specimen . Her work provided some indication that the number and morphology of the chitinous marginal teeth on the opercula could be significant, but the variation was not clear-cut. The structure of Busk's Abrolhos specimen's A-zooid operculum (Cook's fig. 2E, p. 55) corresponds with those of A-zooids from Florida and Caribbean material, and, as there is no other name available for W. Atlantic material, it seems appropriate to continue to use *S. magnilabris* until a complete revision is carried out.

Distribution: W. Atlantic: offshore Georgia to Brazil, Gulf of Mexico, and Caribbean. Reported to be cosmopolitan.

	Lz	Wz	Lo	Wo	Lop	Wop	LBz	WBz	LBop	WBop
N	18	18	6	6	18	18	36	9	9	9
MEAN mm	1	0.59	0.26	0.32	0.43	0.48	1.36	0.71	0.63	0.62
ST DEV mm	0.19	0.05	0.02	0.03	0.15	0.04	0.19	0.05	0.08	0.04
RANGE min	0.792	0.504	0.24	0.28	0.234	0.396	1.08	0.648	0.522	0.54
max	1.38	0.684	0.28	0.34	0.7	0.558	1.584	0.792	0.738	0.666



Figures 73-75. *Steginoporella magnilabris* (Busk) 1854 (*Steginoporella elegans* of Smitt 1873). Fig. 73. *Steginoporella magnilabris*. Colony fragment, life size. Smitt MCZ no. 140. Fig. 74. *Steginoporella magnilabris*. Three skeletal colony fragments. Smitt MCZ no. 97. Fig. 75. *Steginoporella magnilabris* A and B zooids. Smitt MCZ no. 97.

Superfamily Cellarioidea Lamouroux 1821

Family Cellariidae Lamouroux 1821

Genus *Cellaria* Ellis & Solander 1786

Cellaria bassleri Hastings 1947
Figs. 76-82 (Smitt MCZ #112)

Cellaria tenuirostris Smitt, 1872:4, pl. I, figs. 57-59. NOT Busk 1852:
Cellaria nodosa Canu & Bassler, 1928b: 72, pl. 8, figs. 9, 10; Osburn, 1940: 382. NOT *Cellaria nodosa* Norman, 1909: 72.
Cellaria bassleri Hastings, 1947: 232; Cheetham & Sandberg, 1964: 1023, text-figs. 18, 19. Rucker 1967: 824, Fig. 12f.
Cellaria irregularis Osburn, 1947: 19.

Material Examined: Smitt MCZ # 112. *Cellaria tenuirostris*. Jan. 16, 1869, [Cast No. 13] off Tortugas, 68 fm. Pourtales. NMNH: USNM 7472 (Holotype). *Cellaria nodosa*. Albatross Sta. D 2388, Gulf of Mexico.

Description: The colony is erect and tufted (Fig. 76), composed of slender, cylindrical, dichotomously branching internodes, connected by chitinous joints (Fig. 77). Zooids are elliptical-rhomboidal, with a crescent-shaped orifice-opesia, with the operculum hinging on two proximal rod-shaped condyles (Figs. 78-79, 81). The frontal membrane is underlain by an imperforate sparsely beaded cryptocyst. A deeper triangular indentation occurs centrally where this cryptocyst is depressed, then raised to form the rim of the orifice. Avicularia are rare. They replace autozooids in series, and are about the same size and shape, with a spear-shaped mandible (Fig. 82). Ovicelled zooids are larger than autozooids and are grouped on the branch internode bearing them (causing a broadening of the branch). They have a wider D-shaped orifice. The ovicell is immersed, visible outwardly by the central keel or suture line and the slit-like opening in the center of the distal rim of the fertile zooid (Fig. 80).

Discussion: For an organism that has been infrequently collected and even less frequently illustrated, this species has been given a lot of names. Canu & Bassler (1928b) first renamed the species, which was erroneously identified by Smitt as *Cellaria tenuirostris* Busk (1852), a more robust species from Bass Strait. While preparing his monograph on bryozoans of the Allan Hancok Atlantic Expedition, Osburn realized that the name Canu & Bassler had chosen, *Cellaria nodosa*, had also been used for a species described by Norman from Madeira, and he renamed the Caribbean species, *Cellaria irregularis*. However, at about the same time, Hastings had independently reached the same conclusion, and also renamed the species: *Cellaria bassleri*. According to Cheetham & Sandberg 1964, her work was published in January 1947, and Osburn's did not appear until October 1947. Therefore, the name *Cellaria bassleri* has priority.

Distribution: Florida, Caribbean, Gulf of Mexico. Depths from 12-71 fms.

Cellaria bassleri	Lz	Wz	Lo	Wo	Lgz	Wgz	Lav	Wav	Lgz orf	Wgz orf	Lav mand	Wav mand
N	6	6	6	6	3	3	6	6	3	3	3	3
MEAN mm	0.61	0.27	0.07	0.11	0.47	0.25	0.57	0.2	0.07	0.11	0.29	0.1
ST DEV mm	0.04	0.04	0.01	0.01	0.02	0.02	0.03	0.04	0.01	0.01	0	0.01
RANGE min	0.576	0.234	0.054	0.09	0.45	0.234	0.54	0.144	0.063	0.108	0.288	0.09
max	0.684	0.324	0.072	0.108	0.486	0.27	0.63	0.252	0.072	0.117	0.288	0.108

Figures 76-82. *Cellaria bassleri* Hastings 1947 (*Cellaria tenuirostris* of Smitt 1872). Smitt MCZ no. 112. Fig. 76. Three colony fragments, life size, showing branching pattern. Fig. 77. One branch internode, from growing tip to joint. Fig. 78. Three skeletal autozooids. Fig. 79. Zooids near growing edge of branch. Fig. 80. Ovicelled zooids near branch tip. Fig. 81. Close-up of autozooid orifice. Fig. 82. Partially bleached branch, showing avicularium with spear-shaped mandible.

Suborder Ascophorina Levinsen, 1909

Infraorder Acanthostegomorpha Levinsen, 1902

Superfamily Cribrilinoidea Hincks, 1879

Family Cribrilinidae Hincks, 1879
Genus *Puellina* Jullien, 1886

Puellina saginata new species
Figs. 83-88 (Smitt MCZ #16)

Cribrilina radiata Smitt, 1873: 22. IN PART (pl. V, fig. 107, NOT fig. 108) NOT *Eschara radiata* Moll, 1803: 63, pl. 4, figs. 17 a-i.

Holotype. Smitt MCZ# 16. May 4, 1868. Cast no. 11 (off Bahia Honda), 176 fms. Pourt. The other specimen figured by Smitt as *C. radiata* (fig. 108) is not in the MCZ collection.

Diagnosis: Puellina saginata, p. 31. *Puellina* with large zooids, 5 orificial spines, a first pair of costae forming an apertural bar, and a frontal shield with 8-9 pairs of costae not extending to the lateral walls, but delimited from them by a large area of flat gymnocyst.

Etymology: The wide margin of gymnocyst around the frontal shield and the large size of zooids give this species a fattened, expansive appearance compared to other *Puellina* species, hence the name *saginata*, from the Latin adjective saginatus = fattened.

Description: Colony is encrusting, zooids are oval in shape and large for a *Puellina*, about .6 - .8 mm in length (Fig. 83). The frontal surface is composed of a round to oval frontal shield formed by 8-9 pairs of radiating costae, surrounded by a wide margin of smooth flat gymnocyst. The first pair of costae, just under the orifice form an apertural bar, the two meeting like hands touching at the midline; there may be a few small pores between their upper edge and the proximal edge of the orifice, but no large pore. The shield resembles fine smooth basketwork because the broad outer edges of the costae arise smoothly from the marginal gymnocyst, and are not knobbed or tuberculate as in some species. Between the costae are 7-8 small intercostal lacunae. The orifice is semicircular, with a straight proximal edge and five stout oral spines (fig. 87). Avicularia are interzooidal, semi-pedunculate, with a slender, pointed, non-serrated, laterally or diagonally directed rostrum. Ovicells are small, helmet-shaped and imperforate, with a central raised umbo or keel (fig. 85). The orifice of the one ovicelled zooid was more elongate that those of autozooids.

Discussion: Most cribrilinids are very small in both zooid and colony size and and characters of zooids were difficult to differentiate by light microscope. Before the era of SEM the family was considered to consist of just a few widely distributed species. More recently, SEM studies (e.g., Bishop & Household 1987, Hayward & Cook 1983, Harmelin 1988, Harmelin & Aristegui 1988) have shown a suite of characters that can be used to distinguish species. They include the number of orificial spines, the character and position of the apertural bar (first or second set of costae), the number of costae, and lacunal pores, the morphology of the frontal shield, as well as size and shape of avicularia and ovicells. On the basis of these new characters a number of new species, some overlapping in microhabitat preference, have been detected from around the world (e.g. Ristedt 1985, Bishop & Household 1987, Harmelin 1988, Winston & Häkansson 1986). Bishop & Household (1987) also revised the genus *Puellina*, making *Cribrilaria* one of the subgenera they defined.

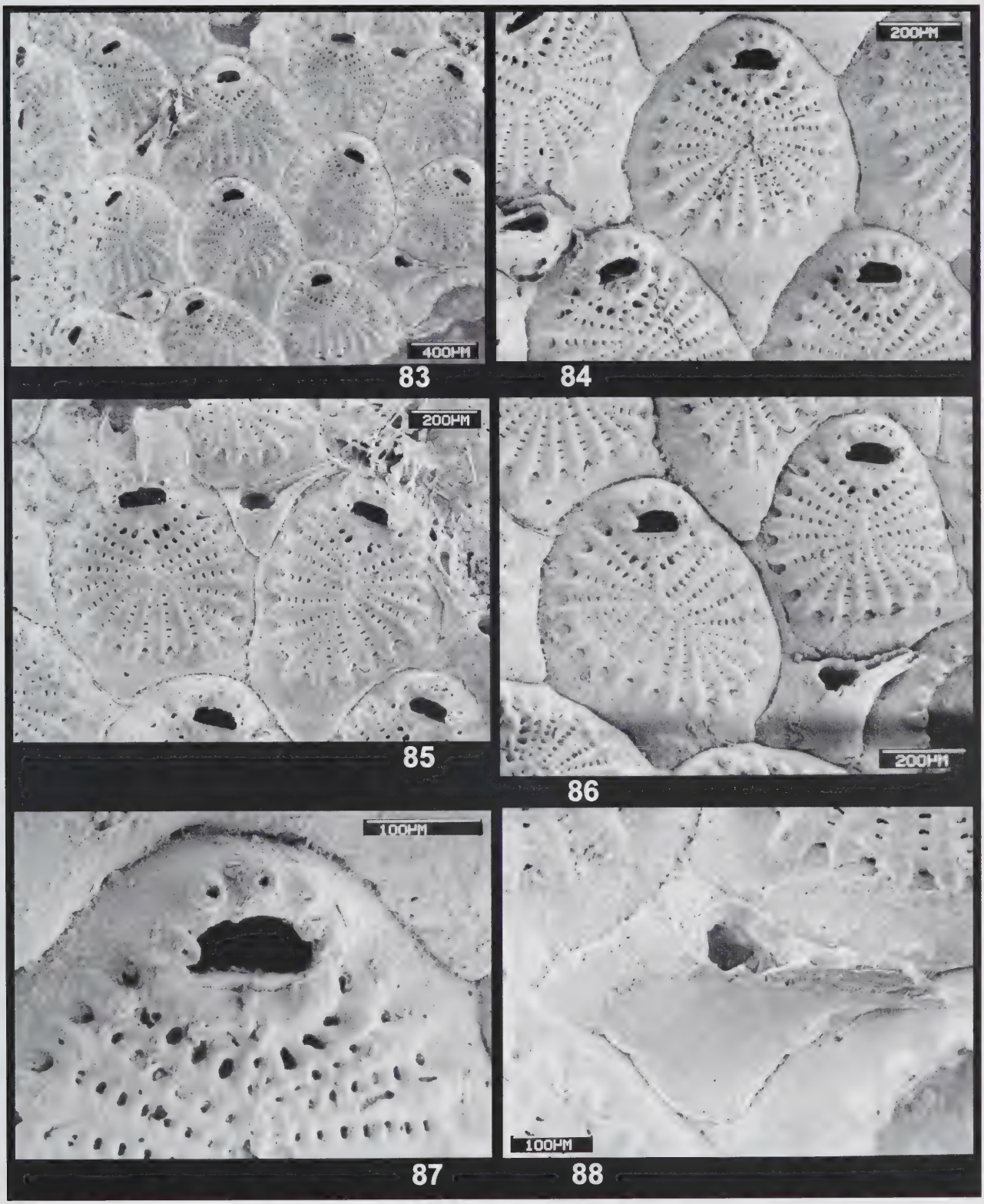
Only one specimen present in the MCZ collection appears to be of the species Smitt illustrated in Fig. 107. It is most likely from the same sample as the specimen illustrated, as it is from 176 fms. The MCZ specimen is encrusting a tan mollusk shell fragment, the type specimen (in the Rijksmuseum collection, NRS no. 1830) is on a brachiopod shell, according to Smitt. In their study of Atlanto-Mediterranean cribrilinids Harmelin & Aristegui (1988) recognized that Smitt's species was not *radiata*, and synonymized it instead, along with other Recent E. Atlantic, Mediterranean, and Pacific specimens under the name *Puellina scripta* (Reuss, 1948: 82, pl. 9, fig. 28), a species described from the Miocene of Austria (holotype illustrated in Bishop & Household: fig. 98, p. 58). In my view the Floridan material corresponds very well with Harmelin & Aristegui's Eastern Atlantic material, but shows significant structural differences from the Miocene material. As Harmelin & Aristegui also noted the zooid size is larger and the degree of exposed lateral and proximal gymnocyst greater in Recent specimens. The orifice and spines all appear smaller, relative to zooid size and these characters are what gives the "fattened" appearance to the species. The large proximal cystid portion of the avicularium is similar on both fossil and Recent material, and gives them an asymmetry not shared by other similar species like *Puellina venusta*. The costae are more raised, flatter and basketwork as in the fossil form. The Stockholm type material has no ovicell. The Smitt MCZ material has only one partially broken ovicell (Fig. 85): small, relative to zooid size, and not very prominent, with a slightly raised central-proximal keel.

A search of the dry bryozoan collection at the National Museum of Natural History found several different *Puellina* species, but no additional specimens of the above species from the Caribbean or Gulf of Mexico region. It is not the same as Canu & Bassler's *Puellina radiata* specimens from Albatross Station D2650 (illustrated in their pl. 10, Fig. 11) nor it is Cheetham & Sandberg's (1964) *C. radiata*.

	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav	Lo ovz	Wo ovz	Lcs	Wcs
N	6	6	6	6	2	2	6	6	1	1	6	6
MEAN mm	0.73	0.56	0.05	0.11	0.26	0.29	0.32	0.21			0.46	0.46
ST DEV mm	0.1	0.08	ERR	0.01	0.01	0	0.09	0.03			0.06	0.04
RANGE min	0.594	0.45	0.054	0.099	0.252	0.288	0.198	0.18	0.072	0.126	0.396	0.396
max	0.882	0.684	0.054	0.126	0.27	0.288	0.468	0.27	0.072	0.126	0.54	0.522

cs=costal shield; l and w oov = length and width of ovicelled zooid operculum

Distribution: W. Atlantic – Florida. E. Atlantic – off Spain and Gibraltar. According to Harmelin & Aristegui (1988) it is a species of the upper bathyal (300+ m) depths.



Figures 83-88. *Puellina saginata* new species (= *Cribrilina radiata* of Smitt, IN PART); all Smitt MCZ # 16, Holotype. Fig. 83. Zooids and avicularia. Fig. 84. Close-up of zooids. Fig. 85. Ovicelled zooid and interzooecial avicularium. Fig. 86. Two zooids and an avicularium. Fig. 87. Close-up of orifice and oral bar. Fig. 88. Avicularium.

Puellina smitti, new species
Figs. 89-93 (Smitt MCZ # 121)

Cribrilina radiata Smitt, 1873: 22. IN PART?. NOT *Eschara radiata* Moll, 1803: 63, pl. 4, figs. 17 a-i.

Cribrilaria flabellifera Banta & Carson, 1977: 392, fig. 4.4; Winston, 1984:13, figs. 25-27. NOT *Cribrilina radiata* var. *flabellifera* Kirkpatrick, 1888: 75. pl.10, fig. 4.

Holotype. Smitt MCZ # 121. [Not identified] with *Trematooecia aviculifera* [identified by Smitt as *Discopora albirostris*] and other species. Tortugas [no date or depth given].

Other specimens examined: USNM36786. *Cribrilaria flabellifera.* Outer Ridge, Carrie Bow Cay,Belize, 20 m. J. E. Winston coll. USNM [no cat. no.] *Cribrilaria.* Alb. Stat. 2319. North of Cuba, 23°10'37"N, 82°20'6"W, 143 fms. [contains two different *Puellina* species, one is *P. smitti*].

Diagnosis: Orifice with six spines, an enlarged first pair of costae, but with a non-enlarged median lacuna above it, 5-8 pairs of rounded costae making up frontal shield, and flabellate avicularia.

Etymology: Named in honor of F. A. Smitt.

Description: Colony encrusting and inconspicuous, often heavily fouled. Zooids very small, ovoid-rhomboidal in shape, with frontal wall composed of 5-8 pairs of radiating, prominent, rounded costae, separated by evenly spaced pores(Figs. 90-91). The first set of costae is enlarged, thicker than the following costae, and may have a bifid median umbo. The orifice is semicircular with 6 oral spines (Figs. 91-92). Ovoid avicularia with smooth calcification, a flaring calcified rostrum (Figs. 91, 93), and a narrow stemmed, subtriangular, paddle-shaped mandible, occur between zooids, and especially at colony growing edge. The ovicell is imperforate, helmet-shaped with a central bump or ridge (Fig. 93).

Discussion: The Florida and Caribbean specimens appear to be a little larger than those of some Indo-Pacific *flabellifera* (see SEM illustrations of lectotype specimen, Figs. 92 and 93 in Bishop & Household 1987, and Indopacific material, pl. 5 of Ristedt 1985), and the costae, although raised like those of *flabellifera,* are rounded, rather than ridged. Banta & Carson (p. 394) also mention that Costa Rican specimens have "larger and proportionately less elongate autozoids" than Mediterranean material, greater variation in number of costae, and that "the plateau of frontal wall between the the first pair of costae and the aperture does not contain a median lacuna larger than the others, as is the case in Mediterranean material". Caribbean material (including Smitt's MCZ specimen, see Fig. 92) does show a small lacuna above the first row of costal pores, but it is much less pronounced than in the type specimen of *flabellifera* illustrated by Bishop & Household which is a large opening in the center of the row of small pores rather than above the row.

The type material of *Puellina flabellifera* is from Mauritius. Some authors have considered the species to have a world-wide tropical, subtropical distribution, including the Mediterranean Sea and the eastern Pacific, but it is much more likely that a species complex, rather than a single species, is involved (Bishop & Houseman 1987), a complex well worth further investigation. The inconspicuous species described above is certainly part of such a species complex.. The one specimen in the Smitt MCZ collection was dead when collected and heavily fouled, but still shows the characters necessary for description.

Distribution: Florida, Caribbean.

Puellina smitti	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	5	5	4	4	2	2	2	2
MEAN mm	0.332	0.228	0.05	0.06	0.11	0.11	0.25	0.12
ST DEV mm	0.43	0.512	0.010	0	0.005	0.005	0.005	0.02
RANGE min	0.28	0.18	0.04	0.06	0.10	0.10	0.24	0.10
max	0.40	0.32	0.06	0.06	0.12	0.12	0.26	0.14

Puellina testudinea new species
Figs. 94-96 (Smitt MCZ #87)

Cribrilina radiata Smitt, 1873: 22 IN PART, pl. V., fig. 108 ? NOT *Eschara radiata* Moll, 1803: 63.

Cribrilina innominata Smitt, 1873: 22 IN PART, pl. V, figs. 109-110. NOT *Lepralia innominata* Couch, 1844: (Couch), 1844: 114.

Puellina innominata Canu & Bassler, 1928b: 73, pl. 14, fig. 2 (possibly, but avicularia. look more curved).

Puellina radiata Canu & Bassler, 1928b: 73, pl. 10, fig. 11 (possibly).

Cribrilaria radiata Winston, 1982:

Holotype. Smitt MCZ # 87. *Porina plagiopora* and *Escharella pertusa* [and not identified, a very small, abraded and skeletal colony of *Puellina*]. 18 January 1869, Cast # 3, W. off Tortugas, 60 fms.

Diagnosis: A species of the *innominata* group, having a costal shield extending to the lateral walls, 5 orificial spines, 5-12 pair of costae, a first set of costae with a large triangular bar below apertural lacuna, and with long pointed avicularia.

Etymology: From the Latin testudineus, -a, -um = of turtles because it was collected from "off the Tortugas".

Description: Colony encrusting, usually small. Zooids small and oval. Orifice D-shaped with five spines around its distal and lateral margins. The frontal wall is a costal shield made up of 5-8 pairs of tapering calcareous ribs, arranged in a radiating pattern from the midpoint out to the lateral edge of the frontal wall, with rows of small pores (lacunae) between them. The

broad outer edges of the costae often thickened or raised into a bump or tubercle. The apertural bar, made up of the ribs just below the flat proximal margin of the orifice forms a raised triangle of calcification around a suboral pore. Ovicells helmet shaped and imperforate with a raised central "keel", in this case a bumpy line of calcification. No ovicells occurred on Smitt fragment illustrated. Specimens from larger shell substrata off the Indian River coast have long pointed interzooidal avicularia.

Discussion: Hayward & Ryland (1998: 330) state that "*Puellina innominata* has been recorded in error from almost every corner of the marine realm, but its actual geographical distribution is almost certainly limited to the northeast Atlantic region." This name and that of *P. radiata* have been used for Western Atlantic material for years. Marcus (1937), who was working in Brazil, synonymized all *radiata* and *innominata* described from around the world as one species, but no western Atlantic material appears to be what we would now recognize as *radiata* or *innominata*. These western Atlantic species need names of their own.

Unlike *Puellina saginata*, in which a large amount of smooth gymnocyst shows outside the frontal shield, in the colony discussed above, the shield extends to the lateral walls of the zooids. Specimens with similar structure from larger shell and coral substrata off the Florida Atlantic shelf (Winston 1982) have long pointed avicularia, an average zooid size of .45 mm, and 5-12 pair of costae. The specimen illustrated as Fig. 108 in Smitt 1873, with its 5 oral spines, long spearhead shaped interzooidal avicularia and 13 costae very much resembles the Indian river area species (Fig. 58, AMNH no. 602) of Winston (1982), and both were collected from *Oculina* rubble at similar depth. Further analysis may show that these should be separate species, but it cannot be determined from the material available. The smaller Capron Shoal sand grain specimens that were called *Cribrilaria innominata* in Winston & Håkansson (1986) are morphologically very similar. They also have 5 oral spines, and a first set of costae which forms triangular suboral bar below an apertural pore. Sand grain specimens are smaller (LZ avg. .316 mm vs. .50 mm) and have fewer costae (10-12). It is re-described and named below:

Distribution: Capron Shoal, off South Hutchinson Island, Florida.

Puellina testudinea	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	6	6	6	6	2	2	1	1
MEAN mm	0.5	0.36	0.05	0.09	0.19	0.2	0.27	0.14
ST DEV mm	0.06	0.03	0	0.01	0.01	0	ERR	ERR
RANGE min	0.414	0.324	0.045	0.09	0.18	0.198	0.27	0.144
max	0.594	0.396	0.054	0.108	0.198	0.198	0.27	0.144

Puellina capronensis new species
Fig. 97 (VMNH no. 629.01)

Cribrilaria innominata Winston & Håkansson, 1986: 18, figs. 40, 42, 44. NOT *Puellina innominata* (Couch), 1844: 114.

Holotype: Puellina capronensis. VMNH no. 610.00. Capron Shoal, near Buoy 10 A, off South Hutchinson Island, St. Lucie Co., Florida. 9 July 1998. J. E. Winston coll.

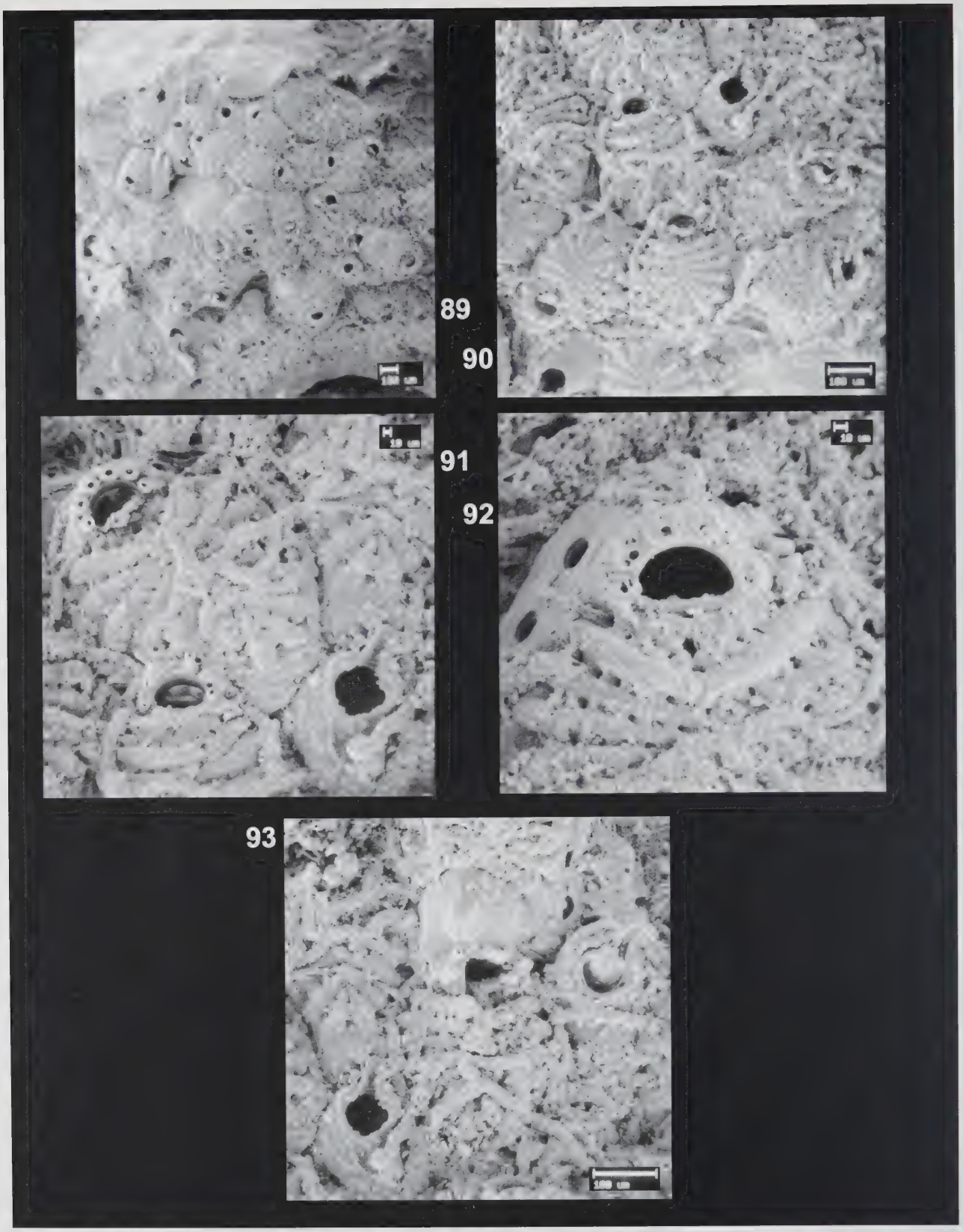
Etymology: Named for the type location.

Diagnosis: Puellina with very small colonies, no avicularia, 5 oral spines, and 10-12 costae of which the first forms a V-shaped ridge beneath a large suboral pore; found on very small substrata (sand to gravel sized grains).

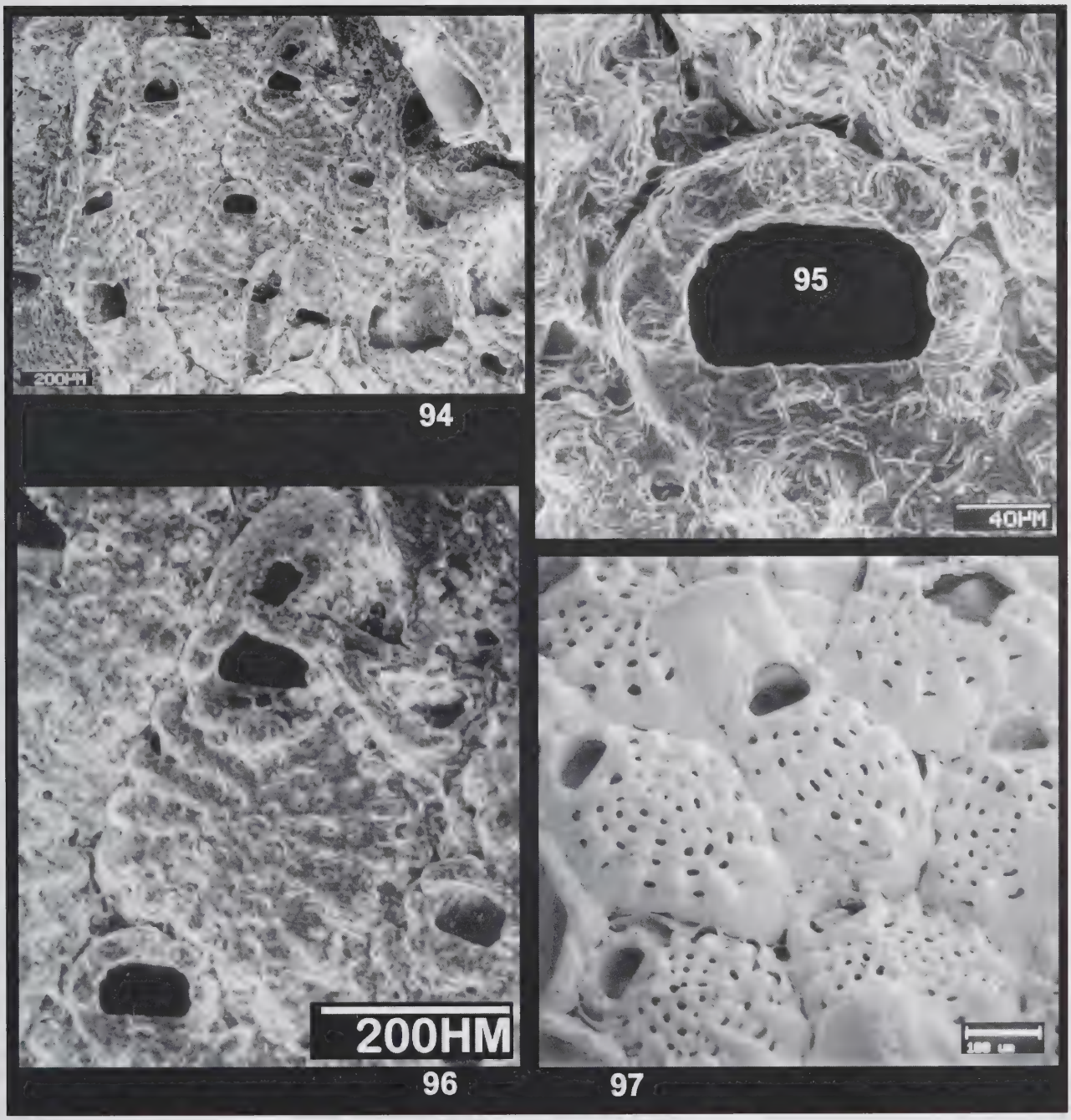
Description: Colonies encrusting, biserial to multiserial on small gravel or sand size grains in subtidal sand. Zooids are ovoid, separated from each other by deep grooves. Orifice semicircular, with five thick distal spines around its rim (four spines on ovicelled zooids). Frontal wall formed by 10-12 fused costae, with radiating rows of pores between them. The outer edges of the costae are thickened and raised into tubercules, giving a roughened or spiny appearance to the frontal surface. Proximal to the orifice is a larger suboral pore, the first pair of costae forming a raised V below it. Ovicells helmet shaped, imperforate, with a raised central keel. No avicularia. 9-10 spines on ancestrula. Reproduction precocious, with ovicells forming within 5 generations of the ancestrula.

Distribution: Capron Shoal, off South Hutchinson Island, Florida.

	Lz	Wz	Lo	Wo	Lov	Wov
N	15	15	15	15	3	3
MEAN	0.316	0.220	0.052	0.074	0.138	0.144
Minimum	0.270	0.144	0.036	0.054	0.126	0.144
Maximum	0.360	0.260	0.054	0.090	0.144	0. 144



Figures 89-93. *Puellina smitti* new species (=*Cribrilina radiata* of Smitt, IN PART). Smitt MCZ # 121. Holotype. Fig. 89. Whole colony on substratum. Fig. 90. Group of dead, fouled zooids. Fig. 91. Zooids and avicularium; note 6 oral spines. Fig. 92. Close-up orifice and raised second pair of costae. Fig. 93. Ovicelled zooid and two avicularia.



Figures 94-97. *Puellina testudinea* new species and *Puellina capronensis* new species. Fig. 94. *Puellina testudinea* (=*Cribrilina innominata* of Smitt, IN PART). Smitt MCZ #87. Group of zooids, uncoated specimen. Smitt MCZ # 87. Fig. 95. *Puellina testudinea* (=*Cribrilina innominata* of Smitt, IN PART). Smitt MCZ #87. Close-up of orifice, showing 5 spines. Uncoated specimen. Smitt MCZ # 87. Fig. 96. *Puellina testudinea* (=*Cribrilina innominata* of Smitt, IN PART). Smitt MCZ #87. Ovicelled zooid. Fig. 97. *Puellina capronensis*, new species, Capron Shoal, Florida. VMNH no. 629.01, a similar *innominata*-like species from the Indian River area of Florida, with 5 oral spines, and first pair of costae raised in a V, but with smaller zooids than the Smitt specimen from #87.

Genus *Reginella* Jullien, 1886

Reginella floridana (Smitt), 1873
Figs. 98-100 (Smitt MCZ # 22)

Cribrilina figularis var. *floridana* Smitt, 1873: 23, pl. 5, fig. 11 (NOT Fig. 112 which is a *Puellina* sp.).
Cribrilina floridana Osburn, 1914: 195.
Puellina floridana 1928b: 74, pl.14, figs. 3, 5, 6, 7 (NOT Fig. 4, redrawn from Smitt's Fig. 112), text-fig. 11-B.
Pelmatopora (sensu lato) *apsata* Shier, 1964: 626, fig. 8.
Reginella floridana Cheetham and Sandberg, 1964: 1026, text-fig. 25; Winston, 1982: 134, fig. 59.

Material Examined: MCZ no. 22. [type status uncertain] [*Reginella floridana*. Not identified on specimen label, but present on undersurface of calcareous substratum, one small skeletal and partly broken colony; which may be the holotype of this species, and specimen illustrated as his Fig. 111], with *Hippothoa mucronata* (= *Hippopleurifera mucronata*) [and also unnoted on the label *Trypostega striatula*]. May 20 4 RM 29 fm. Pourt. 1868.

Description: Colony encrusting. Zooids irregularly oval with a frontal shield made up of five to seven pairs of radially arranged costae, with rows of relatively large lumen pores separating them (Fig. 99). The outer pores may develop into hollow tubules which give the colony a coarse prickly appearance. Orifice semicircular, its proximal edge hidden by the uneven rim of the broad flat medially fused first pair of costae (Fig. 100). Orifice with two erect, bifid or trifid distal spines (broken off in the Smitt MCZ specimen) and two flattened lateral spines which arch over it, joining at its center. No avicularia. Ovicell unknown.

Discussion: Smitt illustrated two colonies he called "*Cribrilina figularis* var. *floridana*". Only the first (Fig. 111), "growing on a piece of shell from 29 fathoms" is *Reginella floridana*, as understood by all the authors who followed Smitt. Allowing for breakage, and the fact that due to the uneven surface of the substratum, the colony had to be scanned at a slightly different angle than that used by Smitt's illustrator, the zooids on the top left side of the Fig. 98 SEM of the *Reginella* specimen from Smitt MCZ #22, are a good match to those of Smitt's figure 111. This could be the type specimen (which was collected from 29 fms. according to Smitt (1873: 23). The material is a dead and partially broken colony with 15 more or less intact zooids remaining. The ends of the distal spines are broken off, as are the lateral oral spines (see Winston, 1982: fig. 59, for an illustration of zooids with intact oral spines), but the fused joint of the broad first pair of costae (Fig.100) is clear. The second specimen figured by Smitt (his figure 112) is not *Reginella floridana*, but a *Puellina* sp. It has more and narrower costae, smaller pores and the fused first pair are lacking, as are the fused lateral oral spines. Smitt thought that this was the result of increasing calcification, and that it indicated a colony "more advanced towards the appearance of *Cribrilina annulata*".

Cook described a *Reginella* aff. *floridana* from Ghana. The specimen she illustrated(Pl. 9F) has a larger number of pairs of costae and lacks the fused lateral oral spines that are characteristic of the Florida material. Probably, as Cook suggested, *R. floridana* is a species complex. No ovicells have been found in either Ghanaian or western Atlantic material, and it seems likely that brooding in this group is internal.

Distribution: Cape Hatteras to Tortugas and Gulf of Mexico.

Reginella floridana		Lz	Wz	Lo	Wo
	N	6	6	6	6
	MEAN mm	0.48	0.37	0.07	0.13
	ST DEV mm	0.03	0.03	0.01	0.01
	RANGE min	0.45	0.324	0.054	0.108
	max	0.522	0.396	0.072	0.144

Figures 98-100. *Reginella floridana* (=*Cribrilina figularis var. floridana* of Smitt, IN PART). Smitt MCZ # 22. Fig. 98. Entire colony. Fig. 99. Group of zooids. Fig. 100. Close up of orifice and spines.

Infraorder Hippothoomorpha Gordon 1989

Superfamily Hippothooidea Busk 1859

Family Trypostegidae Gordon, Tilbrook, & Winston, new family

Diagnosis: Colonies encrusting. Zooids with evenly, minutely porous frontal shield. Orifice with distinct sinuys, the proximal rim with an incipient suture in some taxa, appearing to be derived from vestigial costae. Female zooids with ovicells, the orifice sometimes shaped differently than those of autozooids. Dwarf zooids or zooeciules located between zooids and on distal ends of ovicells. Vicarious avicularia present in some taxa.

Type genus: Trypostega Levinsen, 1909. The genus also includes *Boreas*, *Boreasina*, *Diplotresis*, *Eohippothoa*, *Grammothoa*, *Kronothoa*, *Kunradina*, *Mosathoa*, *Rectoporina*, *Tricolpora*, *Trilophopora*.

Discussion: Dennis Gordon created this family in his unpublished "Interim Classification of the Cheilostomata" *http://www.civgeo.rmit.edu/au/famsys/html* for a clade which includes a range of genera found from Late Cretaceous to Recent, all characterized by a similar minutely porous gymnocystal frontal shield. The ancestral taxon was probably an pliophloeine cribrilinid. See Gordon (2000) for further discussion of ascophoran families derived from cribimorph ancestors (his Model 2). The zooeciules of modern *Trypostega* species are thus derived from avicularia, and the suborificial umbo a remnant of joined suboral costae (still visible in the Pliocene *Trypostega papillata*, Pl. 1, g, p. 22, in Gordon 2000).

Genus *Trypostega* Levinsen 1909

Trypostega striatula (Smitt) 1873 Figs.101-103 (Smitt MCZ #14 and #22)

Gemellipora glabra forma *striatula* Smitt, 1873: 37, pl. XI, fig. 207. NOT *Gemelliporina glabra*, see that entry.

Lepralia inornata Smitt, 1873: 61, pl. XI, fig. 215-216. NOT *Cellepora inornata*, Gabb & Horn, 1862: 127, pl. 19, fig. 10.

Trypostega venusta Osburn, 1914: 198; 1940: 409; 1947: 28; Canu & Bassler, 1920: 330, pl. 85, figs. 15, 16; 1928b: 77, pl. 8, figs. 15, 16; Marcus, 1938: 35, Est. 8, fig. 19; Shier, 1964: 627; Lagaiij, 1973: pl. 2, fig. 10; Winston, 1982: 151, fig. 86; 1984: 18, figs. 37, 38; Taylor & Foster, 1994: 8, pl. 3, figs. 1-4. NOT *Lepralia venusta* Norman, 1864: 84, pl. 10, figs. 2, 3.

Material Examined: Holotype. MCZ #14 [Not identified on label. On underside of one colony of Smitt's *Cupularia stellata*? = *Cupuladria biporosa*]. May 20, 1868, 4 RM, 29 fms. Pourt. MCZ# 22. [not identified on label. With *Hipplopleurifera mucronata* and *Reginella floridana*]. May 20, 1868, 4 RM, 29 fms. Pourt.

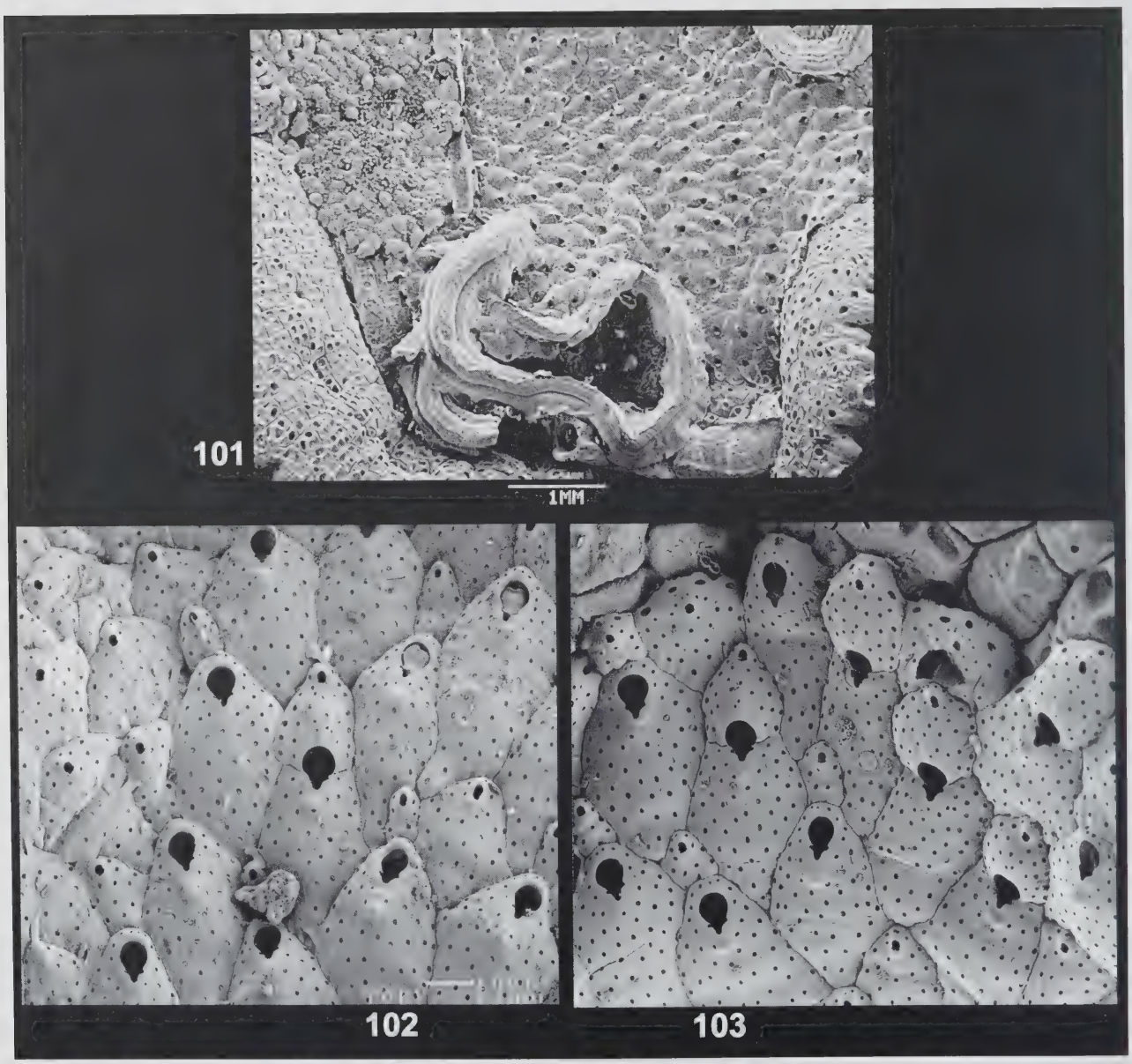
Description: Colonies encrusting, unilaminar, with smooth, glassy, almost transparent calcification. Zooids rhomboidal, with small regularly spaced pores and longitudinal striations over the entire frontal surface (Figs.102-103). Frontal surface flat except for a small suborificial umbo. Zooid orifices are key-hole shaped, rounded distally, with sharp condyles, and a broad V-shaped sinus proximally. Small heterozooids (zooeciules) usually occur at the distal end of each autozooid and may occur irregularly in other locations, apparently where injury and regneration have taken place. Those at the ends of zooids are oval-rhomboidal in shape; those that appear in response to injury tend to be larger and more irregularly polygonal in shape. All are covered with the same small regularly placed pores as autozooids. They have a small elliptical orifice, slightly narrowed part way down the sides, but lacking distinct condyles. The orifice is raised on a short peristome at the distal end of the zooeciules. Ovicells are large, flattened, embedded in frontal calcification, and covered with the same small evenly spaced pores as zooids. Embryos are reddish orange.

Discussion: Smitt appears not to have recognized this species, although *Lepralia venusta* had already been described by Norman (1864). Instead, he described and illlustrated material belonging to *Trypostega* under two different names, *Lepralia inornata* and *Gemellipora glabra* forma *striatula*. Figures of both appear in the same plate (XI). The specimens on which those figures are based are not in the MCZ collections (according to Smitt they were from 26, 60, and 68 fms.). Both specimens in the MCZ collection are from the same station, 4 RM, collected on May 20, 1868, taken from 29 fms. Smitt's illustrations were recognized by later workers as belonging to *Trypostega*, and identified by them as *Trypostega venusta*, described by Norman (1864) from Guernsey. Since its initial description *Trypostega venusta* has been reported from many other parts of the world and considered to have a circumtropical distribution. However, Cook (1985: 167) pointed out that "*T. venusta* is a readily 'recognizable' species. As a result, the variations within and among populations of such correlates as the absolute and relative size of polymorphic zooids, or their frequency and distribution, have not been investigated." Neither have the differences in autozooid size, number of pores, shape of orifice (especially of the sinus) and zooeciule orifice size and shape.

Trypostega striatula	Lz	Wz	Lo	Wo	Lov	Wov	Lzooec	Wzooec
N	6	6	6	6	6	6	6	6
MEAN mm	0.39	0.25	0.08	0.06	0.14	0.16	0.18	0.12
ST DEV mm	0.03	0.04	0	0	0.04	0.01	0.05	0.03
RANGE min	0.36	0.198	0.072	0.054	0.108	0.144	0.126	0.072
max	0.45	0.306	0.081	0.063	0.198	0.18	0.27	0.144

On the basis of these characters, W. Atlantic/Caribbean material differs from holotype material (as illustrated by SEMs in Taylor & Foster, 1994: pl. 3, figs. 3, 4) and British (as illustrated in Hayward & Ryland, 1999: fig. 24) material of *T. venusta*. Compared to *T. venusta* Caribbean *T. striatula* specimens have more elongate zooids with a slightly larger number of pores (averaging 48(N=6) vs. 44(N=5). Autozooid orifices have slightly deeper and more curving V shaped sinuses. Distal zooeciules are relatively smaller compared to autozooids, and those of W. Atlantic/Caribbean specimens have a more elongate and narrowly hoof-shaped orifice than those of *T. venusta* (which are a broader hoof shape). However, the most striking difference between the two populations is in the shape of the orifices of ovicelled zooids. In *T. venusta* orifices are dimorphic. Those of ovicelled zooids have an orifice with a broader shallower sinus. In *T. striatula*, the shape of the orifice of the ovicelled zooids (e.g. fig. 102) is similar to that of autozooids. Ghanaian specimens (Cook 1985) share the E. Atlantic dimorphism. Brazilian specimens (Marcus 1938), on the other hand, fall in with the rest of the W. Atlantic material. However, the Florida sand grain specimens identified as *T. venusta* in Winston & Håkansson (1886: 24, figs. 56, 57), are at least a third smaller in zooid size than either *venusta* or *striatula*, and have a shallow sinus on both autozooids and ovicelled zooids. They probably represent a third species or species group.

Distribution: Cape Hatteras to Brazil. Caribbean, Gulf of Mexico.



Figures 101-103. *Trypostega striatula* (= *Gemellipora glabra* forma *striatula* and *Lepralia inornata* of Smitt). Fig. 101. Whole colony on the underside of *Cupuladria biporosa*. Smitt MCZ # 14. Fig. 102. Group of autozooids, ovicelled zooids and zooeciules. HOLOTYPE. Smitt MCZ #14. Fig. 103. Growing edge of holotype colony on underside of *Cupuladria biporosa*. Smitt MCZ #14.

Family Pasytheidae Davis 1934

Genus *Gemellipora* Smitt 1873

Gemellipora eburnea Smitt 1873
Figs. 104-106 (MCZ Smitt #29)

Gemellipora eburnea Smitt, 1873: 35 IN PART, pl. VII, figs. 152-156. NOT pl. IX, figs. 177a and 178 = *Hippothoa flagellum* Manzoni, 1870 [or *Hippothoa eburnea* (Smitt) if they are different].

Pasythea eburnea Smitt, 1873; Busk, 1885: 5, pl. 34, fig. 1; Canu & Bassler, 1928b: 15, pl. 8, figs. 11-12.

Gemellipora eburnea Osburn, 1940: 463, pl. 9, figs. 73-74; Lagaaij & Cook, 1973: 494.

Material Examined: Syntype. SMITT MCZ# 29, May 9th, 1868, off the Samboues, 121 fms. MCZ CAT. No. 545. *Gemellipora eburnea.* Key West, Pourtalès [no date or depths]. MCZ Cat. No. 272. *Gemellipora eburnea.* A. Agassiz, Barbados, 76 fms. USCS *Blake*, Caribbean Islands Exploration, 1878-1879. One of the more common species in deep water samples from the other *Blake* cruises in the MCZ bryozoan collection.

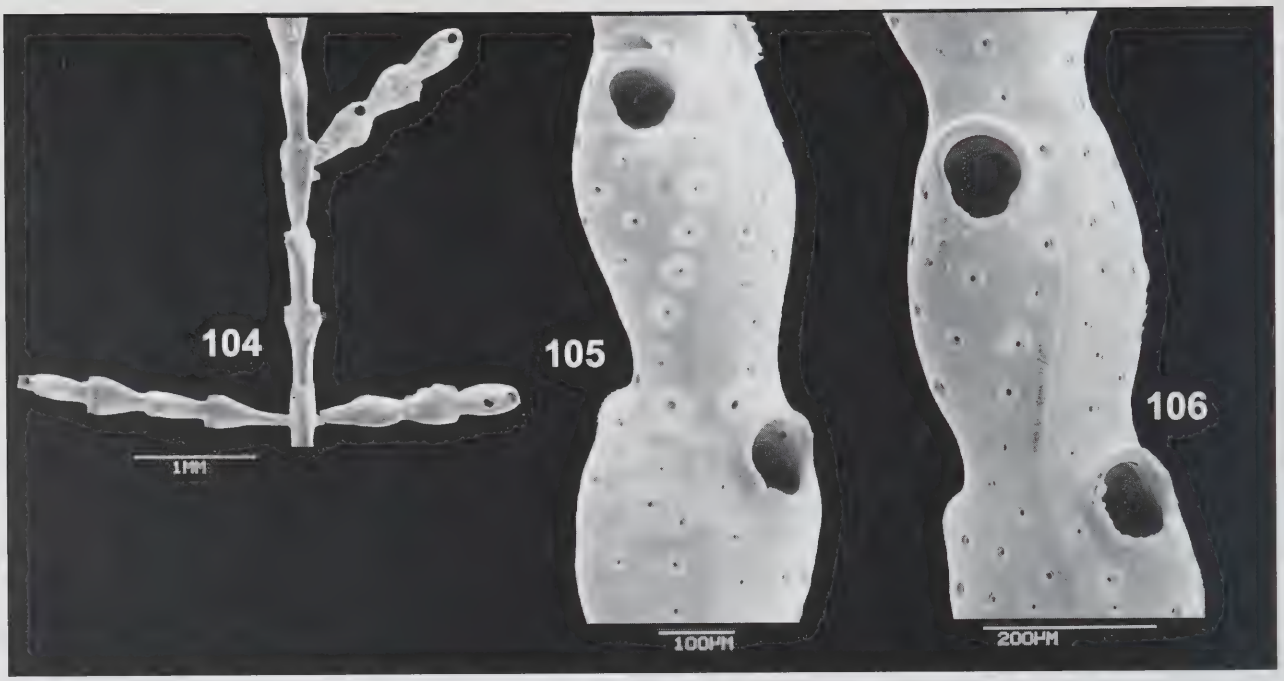
Description: Colony glassy white, erect, jointed, composed of evenly pinnate branches, diverging off a central axis, both axis and lateral branches composed of back to back pairs of zooids (Fig. 104). Joints at irregular intervals along the main axis and at the base of each branch, branching taking place immediately distal to a joint in the main axis. Zooids tubular, tear-drop shaped, their boundaries marked by faint indentations. Frontal and lateral walls smoothly calcified, with a curving row of about 6 small marginal pores (each with a depressed rim around a tiny opening), and scattered frontal pores toward zooid centers. The sinuous curve of pores follows the spiral displacement of the zooids as each one is twisted in growth, so that its orifice is displaced 90° from that of its predecessor (Figs. 105, 106). Orifice smooth-rimmed, club-shaped, with a round anterior portion and a curved, shallowly V-shaped posterior sinus. No spines, ovicells, or avicularia. In SEM illustrations specimens appear thick and opaque, but dried uncoated specimens are clear and glassy, the brownish polypide remains visible inside zooids. Chitinous opercula and joints are golden yellow.

Gemellipora eburnea	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	0.53	0.23	0.1	0.09
ST DEV mm	0.06	0.02	0.01	0
RANGE min	0.45	0.198	0.09	0.09
max	0.63	0.252	0.108	0.099

Discussion: Smitt created a new genus for this beautiful deep-water form, which to him resembled a crisiid cyclostome, although, with their large size and regular pinnate branching, specimens preserved in alcohol seem to more closely resemble white plumulariid hydroids. The colony in the Smitt MCZ collection has no base, but Smitt (Fig. 152) shows a basal region made up of chains of encrusting zooids. Their orifices and pores are like those of erect branches, and the orifices of zooids succeeding each other are displaced in opposite directions. He shows a broken off tube, that is the beginning of an erect main branch axis. Unfortunately Smitt also included some other encrusting specimens in his description (pl. IX, figs. 177a, 178) which belong to a *Hippothoa* species (*Hippothoa flagellum*-like). No material of this species was found in the MCZ Smitt material, so its identity cannot be given with certainty. Canu & Bassler (1928b) seem to have found the same hippothoid, but did not give it a separate name. Osburn (1940: 408) did not find it in Puerto Rican collections, but had this comment. "In the writer's opinion they would have done better to rename the species, for certainly Smitt never distinguished it as different from his *Pasythea* (*Gemellipora*) *eburnea*, but since they have accepted it as a species of *Hippothoa* the name may be allowed to stand." Cook (1985) described an encrusting species of Gemellipora, *Gemellipora adhaerans*, from Ghana, with a colony made up of branching chains of caudate zooids with clavate orifices and many small pores.

Controversy has also existed over the generic placement of G. *eburnea*. Busk (1884) and Canu & Bassler (1928b, 1929) placed it in *Pasythea*. Osburn (1940) defined *Pasythea* as having branches consisting of elongated kenozooids. *Gemellipora* has branches made up of autozooids, but like *Pasythea*, *Gemellipora* colonies lack avicularia and ovicells. Both genera have been included in the Pasytheidae (Davis, 1934).

Distribution: Deep water species recorded from the Florida, the Caribbean and Brazil -114 fms to 729 m. It has also been reported from the east Atlantic (Bay of Biscay, Madeira) (Waters 1899).



Figures 104-106. *Gemellipora eburnea* (=*Gemellipora eburnea* of Smitt, IN PART). Smitt MCZ # 29. Fig. 104. Portion of the branching colony. Fig. 105. Close-up of zooids. Fig. 106. Close-up of zooids, showing curving rows of marginal pores.

Infraorder Umbonulomorpha Gordon 1989

Superfamily Arachnopusioidea Jullien, 1888

Family Exechonellidae Harmer, 1957

Genus *Triporula* Canu & Bassler, 1927

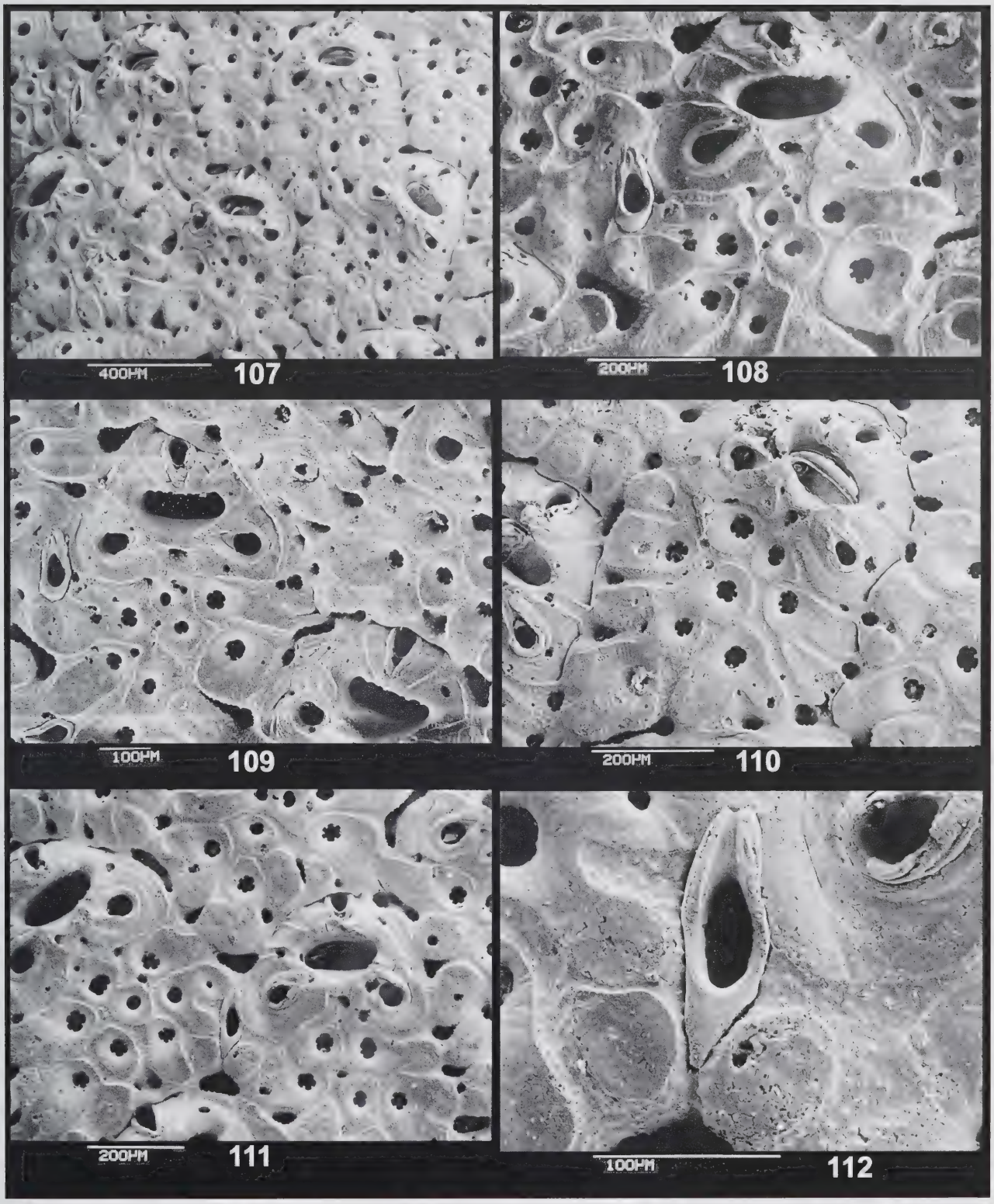
Triporula stellata (Smitt) 1873
Figs.107-112 (Smitt MCZ #25)

Escharipora stellata Smitt, 1873: 26, pl. VI, figs. 130-133.
Triporula stellata Canu & Bassler, 1927: 8.
NOT *Triporula stellata* Cook, 1967: 343, pl. 2A, B, figs. 12, 13; 1968a: 174; 1985: 127, pl. 15D, fig. 1C; Lagaaij, 1973: 147, pl. 2, fig. 9.

Material Examined: All Syntypes. Smitt MCZ no.13. *Escharipora stellata* vertes! [Illustrated specimen, figs. 130 and 133, according to label copy] May 11, 7# D[redging] [off Sand Key], 103 fms. MCZ no.25. *Escharipora stellata* May 6, 1868. Cast no. 7. Off American Shoal. 89 fms. Pourt. MCZ Smitt no. 106. *Escharipora stellata.* Jan. 16, 1869. Cast No. 12 W. of Tortugas, 49 fms. Pourt. MCZ # 107. [not identified = *Triporula stellata*] Florida. Pourt. 1869. MCZ Smitt No. 114. *Escharipora stellata.* [May 8] 1869. [Dredge 4, Off Alligator Reef] Florida., 68 fms. Pourt. MCZ Smitt No. 176. *Discopora pertusa, Escharipora stellata.* Jan. 16, 1869. Cast No. 12 W. of Tortugas, 42 fms. MCZ Smitt No. 179. *Escharipora stellata.* May 1, 1868. # S. [Off Sombrero], 183 fms. Pourt. USNM 68676. *Adeonellopsis coccinella* Co-types. C.& B. Miocene. Chipola Marl, Chipola River, Calhoun Co., Florida.

Description: The colony is encrusting and rough textured with a thick iridescent cuticle; dried specimens creamy white in color. Zooids are oval in shape, with a thick frontal shield, its calcification a mosaic of irregular channels floored by granular calcification separating raised, smooth-textured platforms, with central depressions containing large pores, with inward projecting denticles that give them a stellate or flower shape. There are about 7-12 stellate pores per zooid. Zooid boundaries are marked by narrow grooves and irregularly-shaped marginal pores. The orifice is transversely oval and surrounded by a low, thick, rounded peristome, on which three pointed avicularia rest at an angle to the frontal wall surface. Two are adjacent to the orifice, their bases below it, and their mandibles pointed transversely toward (and projecting slightly into) the secondary orifice, and one is located at the distal end of the orifice, with its mandible directed proximally toward the orifice (e.g., Fig.109). Triangular, adventitious avicularia occur rarely in zooid margins (Fig. 112). None of the avicularia have crossbars. No ovicells occur in the genus. According to Cook (1985) embryos are brooded in internal ovisacs.

Triporula stellata		Lz	Wz	Lo	Wo	Lav	Wav
	N	18	18	18	18	18	18
	MEAN mm	0.78	0.51	0.07	0.16	0.11	0.05
	ST DEV mm	0.13	0.13	0.01	0.04	0.02	0.01
	RANGE min	0.54	0.27	0.054	0.108	0.08	0.036
	max	0.954	0.66	0.1	0.22	0.126	0.054



Figures 107-112. *Triporula stellata* (Smitt) 1873 (=*Escharipora stellata* of Smitt). All Smitt MCZ # 25. Fig. 107. Group of 5 zooids. Fig. 108. Close-up of one zooid showing oral and interzooecial avicularia. Fig. 109. Group of zooids. Fig. 110. Single zooid showing petal-shaped pores. Fig. 111. Two zooids. Fig. 112. Interzooecial avicularium.

Discussion: The genus, with a frontal shield formed by the fusion of spinous processes (Cook 1967), was created by Canu & Bassler (1927) for Smitt's Recent Florida species, but it also seems to fit a number of fossil species including Canu & Bassler's *Adeonellopsis coccinella* (Canu & Bassler, 1923: 161, pl. 24, figs. 5-8), from the Lower Miocene of Florida (USNM cat. no. 68676), which appears to be very similar to the Recent Florida species, as well as other fossil and Recent species from the Miocene to Recent from Africa, the Eastern Pacific and Australia and New Zealand (Cook 1967, Was & Yoo 1983). The Florida Miocene species has avicularia very similar to those of *Triporula stellata*, but they are oriented at a different angle. Rucker (1967) also reported *Adeonellopsis coccinella* from Recent eastern Caribbean shelf sediments.

W. African specimens studied by Cook (Cook 1967, 1968a) were considered to be conspecific with American material. However, more recent SEM photographs (pl. 14D in Cook 1985) show significant differences, indicating that the African material represents a different species of *Triporula*. Orifice shape in Florida *T. stellata* is transversely oval in both less and more greatly calcified zooids vs. triangular in African specimens. Both species have three oral avicularia, but in the African species the two lateral avicularia are larger than the distal avicularium, which according to Cook is very small and may be replaced by a pore. In the Smitt MCZ Florida material, the lateral and distal avicularia are similar in size, and the distal avicularium may still be distinguished even in heavily calcified zooids. In African zooids the lateral avicularia are also larger relative to the orifice size, and differ in postion reaching to the top of the orifice and starting just below it. The Floridan specimens have lateral avicularia with bases often well below the orifice and either have rostra trips protruding into the proximal edge of the orifice or not even reaching it. Colonies of African *Triporula* are often massive and plurilaminar; all the Floridan specimens in the MCZ collection are quite small.

Wass & Yoo (1983) suggested that SEM study might reveal the Miocene to Recent New Zealand and Australian species *Anarthropora biarmata* (Waters) to be conspecific with *T. stellata*. In fact, comparison of SEM photos clearly shows the differences in zooid morphology between the two. The proximal rim of the orifice in the specimen of *A. biarmata* they illustrate is slightly convex and has below it a thickened imperforate area, whereas in *T. stellata* one or more pores occur just below the orifice. The number of frontal pores appears to be much greater in *A. biarmata* (20-25) than in *T. stellata* (7-12), and in *T. stellata* the suboral avicularia are directed more nearly transversely.

Distribution: Cape Hatteras to Florida.

Superfamily Adeonoidea Busk 1884

Family Adeonidae Busk 1884

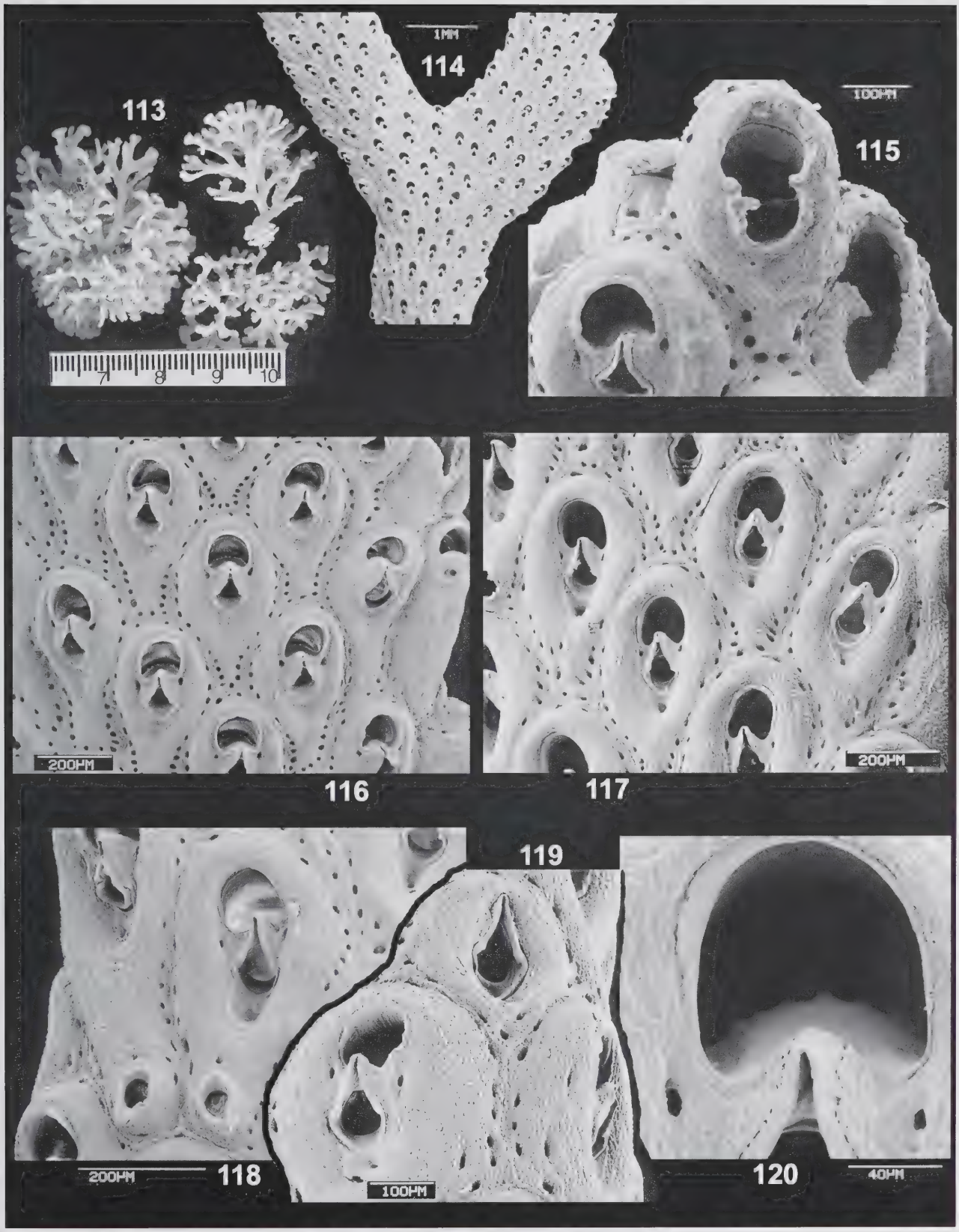
Genus *Bracebridgia* MacGillivray 1886

Bracebridgia subsulcata (Smitt) 1873
Figures 113-120 (MCZ Smitt #104 and #155)

Porina subsulcata Smitt, 1873: 28., pl. VI, figs. 136-140; Verrill, 1900: 54; Osburn, 1914: 199.

Bracebridgia subsulcata Canu & Bassler, 1928b: 127, pl. 23, figs. 1-3, text-fig. 25; Osburn, 1940: 446; Osburn, 1947: 38; Cook, 1973: 253, pl. 2, figs. 4-6.

Materials Examined: All Syntypes. Smitt MCZ #10. *Porina subsulcata.* 1868 (date?), 2 miles S. of Rebecca Shoal, 10 fm., Smitt MCZ #19. *Porina subsulcata.* March 13 1868, East Key, Florida, 113 fms., Pourt., Smitt MCZ #70. *Porina subsulcata.* Jan. 16 1869, Cast no. 5, W. of Tortugas, 36 fm., Pourt., Smitt MCZ #71 *Porina subsulcata.* Jan. 16, 1869, Cast no. 6, W. of Tortugas, 36 [fm.], Pourt., Smitt MCZ # 74. *Porina subsulcata.* Jan. 16, 1869, Cast no. 7, W. of Tortugas, 1869, 35 fms. Smitt MCZ #77. [no id = *Bracebridgia subsulcata*]. Jan. 16, 1869, W. of Tortugas, Cast No. 11, Depth 43 fms. Smitt MCZ #95. *Porina subsulcata.* March 10 1869 [cast no. 2] Doubleheaded Shot Key, 471 fms., Pourt., Smitt MCZ # 104. *Porina subsulcata.* March 21, 1869, Cast no. 8, off Carysfort Reef, 35 fms. Bryozoa [including *Bracebridgia subsulcata*]. Florida. L. F. Pourtales. #180, Jan. 16, 1869, Cast [no number] W. of Tortugas, 37 fms., Pourt. Smitt reports it from 10-48 and 471 fms. Also MCZ Cat. no. 112 *Bracebridgia subsulcata,* 1877, Blake, Agassiz, 24° 37.5' N, 83° 36' W, Blake no. 26, 110 fms. VMNH no. 2871.00 off West Palm Beach, M&D Littler, 20 July 2002.



Figures 113-120. *Bracebridgia subsulcata* (Smitt) 1873 (=*Porina subsulcata* of Smitt). Fig. 113. Colonies, life size, from Smitt MCZ # 155. Fig. 114. Colony branch. Smitt MCZ # 104. Fig. 115. Zooids forming at growing edge of branch. Smitt MCZ # 104. Fig. 116. Group of zooids near growing edge. Smitt MCZ # 104. Fig. 117. Group of more heavily calcified zooids. Smitt MCZ # 104. Fig. 118. Zooids with proximal avicularia. Smitt MCZ # 104. Fig. 119. Smitt MCZ # 104. Zooids and interzooecial avicularium. Fig. 120. Close-up of orifice. Smitt MCZ # 104.

Description: Colony, erect from an encrusting base, is composed of broad, rigid, flattened and dichotomously branching fronds. Zooids are claviform, the frontal wall distinctively rough-textured, with calcification in sharp-edged scaly crystals (Fig.119) and imperforate except for spiramen, and rows of small marginal and avicularian pores. The frontal surface is convex at the margins and depressed at its center around the distally oriented, spear-shaped suboral avicularium (Fig. 106-107). The secondary orifice is crescent-shaped, its proximal edge interrupted centrally by the tip of the suboral avicularium, the primary orifice (inside the hooded peristome) proximally convex and serrated (Fig.120). An additional, proximally-directed, triangular frontal avicularium may occur at proximal ends of zooids (lower left, in Fig. 118). Some larger interzooidal avicularia occur at branch edges. No ovicells; embryos are brooded in gonozooids. No sexual dimorphism apparent.

	Lz	Wz	Lo	Wo	Lav	Wav
N	18	18	18	18	18	18
MEAN mm	0.5	0.28	0.11	0.11	0.12	0.07
ST DEV mm	0.06	0.02	0.02	0.02	0.01	0.01
RANGE min	0.396	0.234	0.072	0.072	0.108	0.054
max	0.612	0.32	0.126	0.14	0.144	0.08

Discussion: Zooid ontogeny of *B. subsulcata* was studied by Cook (1973) who found a spiramen in developing zooids (e.g., in Fig.115), which becomes closed over as the avicularium develops. Thus, the frontal wall in *Bracebridgia* develops in an umbonulid manner, similar to that in *Reptadeonella*, *Adeona* and *Adeonellopsis*, supporting its inclusion with them in the Adeonidae. The genus was established for an Australian species, *Bracebridgia pyriformis*, found off the south coast of Australia. Other living species occurr in Australia and the Philippines. The pattern of frontal wall calcification and the lyrula of the primary orifice uniquely circumscribe these species.

Distribution: Cape Hatteras, Bermuda, Florida, Caribbean.

Genus *Reptadeonella* Busk 1884

Reptadeonella bipartita (Canu & Bassler) 1928
Figs. 121-122 (Smitt MCZ #81)

Porina violacea Smitt, 1873: 30 (no illustration).
Adeona bipartita Canu & Bassler, 1928a: 94, pl. 8, fig. 2; Marcus, 1949: 25, figs. 37-39.
Reptadeonella bipartita Winston, 1986: 24, fig. 50.

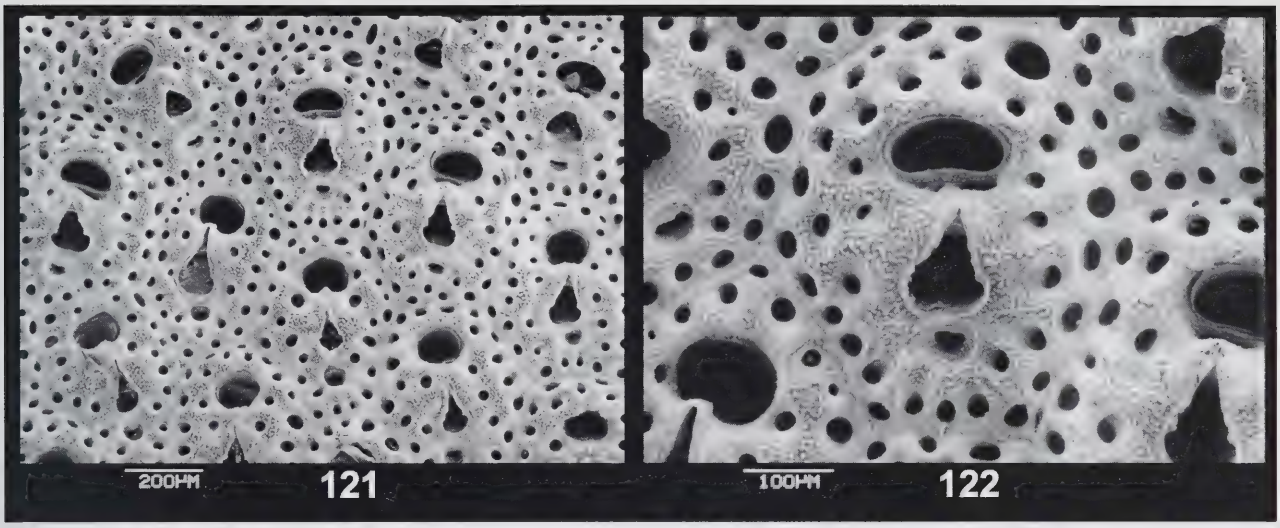
Material Examined: Smitt MCZ # 81, *Porina violacea*, Jan. 16, 1869, cast no. 7, W. of Tortugas, 35 fm., Pourt. Smitt MCZ # 128. [not identified, with] *Cribellopora constellata* and *Stephanollona serrata*. Jan. 16, 1869. Cast No. 12, W. Of Tortugas, 42 fms. Pourt. VMNH no.2878.00 *Reptadeonella bipartita*. Off West Palm Beach, Palm Beach Co. Florida, M. &D. Littler, 20 July 2002.

Description: Colonies are encrusting, a dark iridescent purple when alive, retaining purplish black pigment when dry. Autozooids are hexagonal to rhomboidal in shape, frontal surface convex, made up of thick granular calcification, penetrated by a double row of large pores. The secondary orifice is transversely oval. Below the orifice is a central sharp pointed avicularium, its rounded base indented with a pair of condyles. The tip of the avicularian rostrum protrudes above the midpoint of the proximal edge of the orifice, behind it, inside the peristome, is an elongated pore or groove. Below the avicularium in the proximal quarter of the zooid is a transversely oval to crescent-shaped spiramen. Gonozooids are similar in size to autozooids, but have a longer, narrower, more crescent-shaped orifice (Fig. 122). The area between the distal end of the zooid and the orifice of the gonozooids is also somewhat enlarged and bears more numerous pores.

Discussion: Only two specimens in the MCZ Smitt collection appears to be what Smitt identified as *Reptadeonella violacea* and only one of those was identified by him. *Reptadeonella violacea* is a European species with a distally directed avicularium. It is found from the Mediterranean to the English coast, reaching its northernmost limit at the Isle of Man (Hayward & Ryland 1979). Other species are found in the tropical Western Atlantic (e.g., *R. costulata*, *R. hastingsae*), but *bipartita* is the only one with the avicularium tip distally directed.

Distribution: Florida, Caribbean, Brazil.

Reptadeonella bipartita	Lz	Wz	Lo	Wo	Lgz	Wgz	Lav	Wav	Logz	Wogz
N	12	12	12	12	4	4	12	12	4	4
MEAN mm	0.51	0.35	0.08	0.1	0.51	0.41	0.12	0.07	0.06	0.14
ST DEV mm	0.08	0.07	0.01	0.01	0.03	0.03	0.03	0.01	0.01	0
RANGE min	0.378	0.252	0.072	0.09	0.486	0.378	0.09	0.054	0.054	0.144
max	0.666	0.432	0.09	0.126	0.558	0.432	0.18	0.081	0.072	0.144



Figures 121-122. *Reptadeonella bipartita* Canu & Bassler 1928 (=*Porina violacea* of Smitt). Smitt MCZ #81. Fig. 121. Group of zooids. Fig. 122. Close-up of gonozooid.

Reptadeonella hastingsae Cheetham & Sandberg 1964
Figs. 123-128 (Smitt MCZ#87)

Porina plagiopora Smitt, 1873: 30, pl. VI, figs. 134, 135. NOT *Lepralia plagiopora* Busk, 1859: 44, pl. IV, fig. 5.

Reptadeonella hastingsae Cheetham & Sandberg, 1964: 1039, text-fig. 52.

Reptadeonella costulata Winston, 1982: 137, fig. 63.

Material Examined: MCZ Smitt #87, *Porina plagiopora* (with *Escharella pertusa*), Jan. 18, 1869, Cast no. 3, W. off Tortugas, 60 fms., Pourt. This appears to be the station Smitt (1873) mentions on p. 30, "...taken by Pourtales as a depth of 60 fathoms, west off Tortugas." It is the only specimen present in the MCZ Smitt collection. *Reptadeonella hastingsae*. 7 miles off Pierce, St. Lucie Co. Florida. M. & D. Littler 21 June 2001.

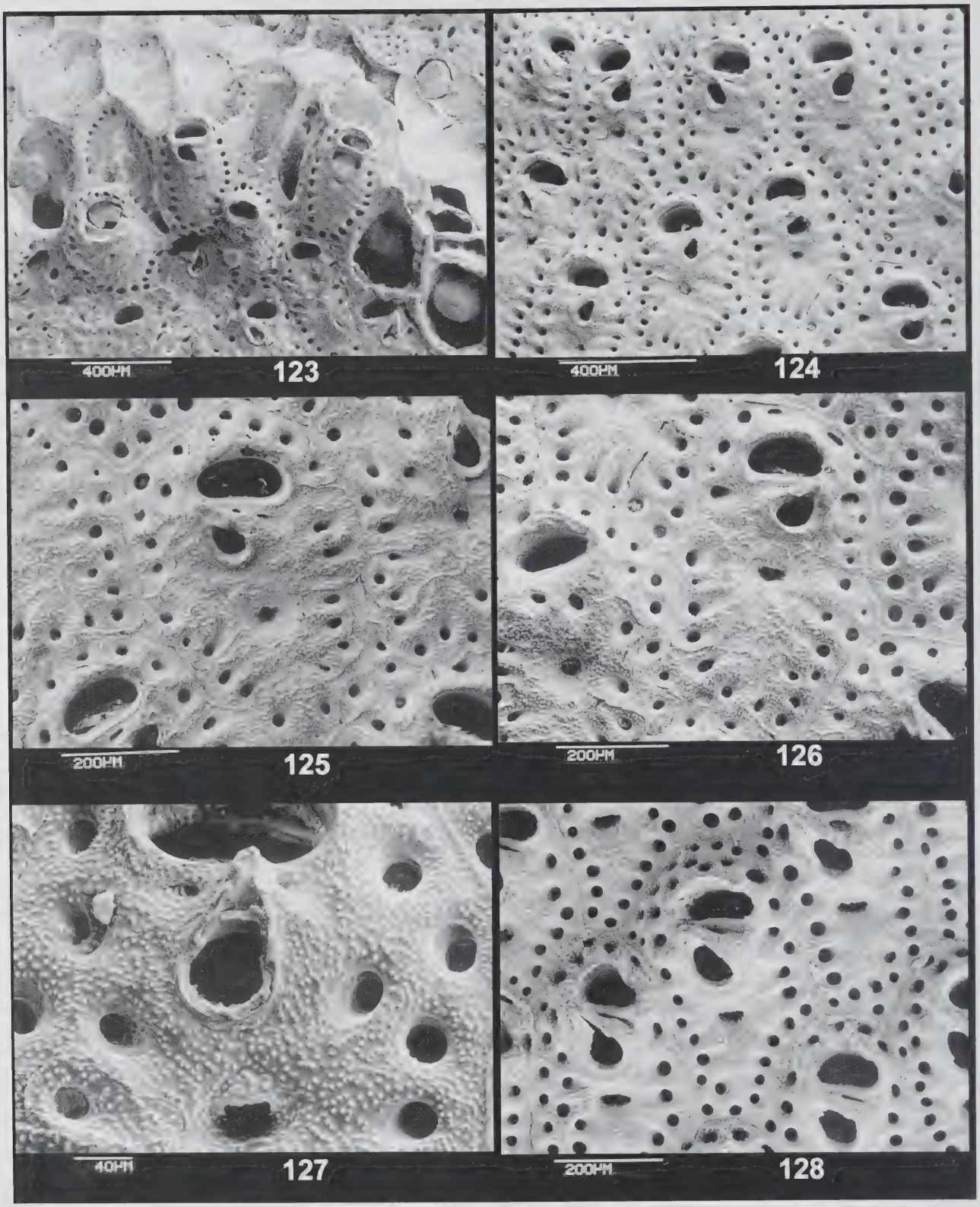
Description: The colony is encrusting and dark brown in color when alive. Autozooids are sub-rhomboidal in shape, with thick granular frontal calcification and a row of marginal pores. A pattern of marginal ridges and furrows (leading to the marginal pores) characterizes zooid frontal surfaces (Fig. 124). A few additional pores, but not another complete row, may occur inside the marginal row of pores. The primary orifice is oval. The secondary orifice is also transversely oval, at the end of a short peristome. A triangular avicularium with a rounded base is placed at the center of the zooid and directed diagonally upward, its tip reaching one side of the orifice. Just below the avicularium a round to short, crescent-shaped spiramen lies in a depression in the calcification. Gonozooids in this species are similar to autozooids in size and shape, but may show an additional row of pores distal to the orifice (Fig. 128).

	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.62	0.38	0.08	0.14	0.12	0.05
ST DEV mm	0.05	0.04	0.01	0.01	0.02	ERR
RANGE min	0.558	0.342	0.063	0.126	0.09	0.054
max	0.702	0.45	0.09	0.144	0.126	0.054

Discussion: In autozooid morphology this species is similar to *Reptadeonalla plagiopora*, a Pliocene species from the Coralline Crag, and the identification given the Floridan material by Smitt. However, unlike the fossil species, and some other living *Reptadeonella, Reptadeonella hastingsae* does not possess markedly dimorphic gonozooids. *Reptadeonella hastingsae* was described by Cheetham & Sandberg (1964) from subfossil specimens from Lousiana mudlumps (northern Gulf of Mexico). Smitt's figures 134 and 135, show zooids with the proportions, orifice and avicularian morphology characteristic of this species; although he shows all zooids with round ascopores and this is variable in his material (e.g., Figs. 124, 127, 128 of this paper).

Repadeonella hastingsae was recorded from the Florida Atlantic region by Winston (1982) as *Reptadeonella costulata*, in the belief that *R. hastingsae* was a junior synonym for *R. costulata* (Canu & Bassler, 1928a: 94). However, further study of Caribbean and Florida material has shown that there are at least two Recent species of *Reptadeonella* with diagonally directed avicularia present in this region, *R. hastingsae* and *R. costulata*. *Reptadeonella costulata*, common in cryptic reef environments in Jamaica and Belize, has considerably larger zooids (lz avg.= 0.85 mm, vs. lz avg. 0.50 mm). The avicularia are longer than those of *hastingsae* and have a slender rostrum with a spatulate tip which sometimes extends beyond the distal edge of the orifice. Gonozooids of *R. costulata* differ more from non-female autozooids and are often clumped together in colonies.

Distribution: Florida, Gulf of Mexico.



Figures 123-128. *Reptadeonella hastingsae* Cheetham & Sandberg 1964. (= *Porina plagiopora* of Smitt). Smitt MCZ no. 87. Fig. 123. Portion of the growing edge of colony. Fig. 124. Group of autozooids, showing furrowed frontal wall, marginal pores, avicularia and variability in spiramen shape. Figs. 125, 126. Close ups of zooids. Fig. 127. Close up of avicularium and spiramen. Fig. 128. Group of zooids, with gonozooid in center, note extra pores above the orifice.

Superfamily Lepralielloidea Vigneaux, 1949

Family Lepralliellidae Vigneaux, 1949

Genus *Celleporaria* Lamouroux, 1821

Celleporaria albirostris (Smitt) 1873
Figs. 129-135 (Smitt MCZ# 83, #166, # 123)

Discopora albirostris forma *typica* Smitt, 1873: 70, pl. 12, figs. 234-239. NOT Fig. 233a&b = *Aimulosia pusilla.*

Holoporella albirostris, Osburn, 1914: 215; Canu & Bassler, 1918: 120; Osburn, 1927: 130; Canu & Bassler, 1928b: 142, pl. 22, figs. 10-11, text-fig. 31; Osburn, 1940: 455; Osburn, 1947: 43.

Celleporaria albirostris Long & Rucker, 1970: 20, fig. 5, 6; Winston, 1984: 17, figs. 33, 34.

Material Examined: All Syntype. Smitt MCZ#57. *Discopora albirostris* [and *C. magnifica*] Tortugas 1868 [no date or depth]. Smitt MCZ # 83. *Discopora albirostris*. May 4, Cast No. 1, 19 fms. Pourt. 1869. #121 *Discopora albirostris*. Tortugas. #123. *Discopora albirostris* Jan. 16, 1869 [Casts no. 6&7?] W. of Tortugas, 35 fms. #147 *Discopora albirostris* May 11, 1869. Cast no. 1. Off Conch Reef, 30 fms. #166. *Discopora albirostris* (type for figs. 234-235) Jan. 18, 1869. Cast no. 1 SW of Tortugas, 25 fms. verte!

Description: Colonies encrusting, unilaminar to massive and multilaminar, when alive with brightly colored dermal pigments, pink to wine or cerise, white sharp pointed suboral spines giving colonies a rough, prickly texture, and regularly patterned excurrent monticules that show as white spots on deeply pigmented colonies. Zooids ranging from subrectangular at growing edge to irregularly polygonal in frontally budded layers, frontal surface rising to a conical peak in the point of the suboral umbo. Frontal wall imperforate, except for a scattering of marginal pores, and of a wavy, granular texture. The orifice is subcircular, with a shallow, curved proximal border. At the base of the suboral umbo is a vertically directed adventitious avicularium, with a serrated rostrum. Ovicells imperforate, globular, hood-shaped, their calcification showing suture lines, their openings partially blocked by the suboral spine and avicularium. Embryos orange red. Large interzooidal avicularia with blunt-pointed to spatulate mandibles occur between zooids (e.g., Fig. 133).

Discussion: This is a common species in shallow Caribbean reef environments. It has also been reported from the southeastern U. S. shelf (Maturo 1968).

Distribution: Cape Hatteras to Florida, Caribbean, and Gulf of Mexico.

Celleporaria albirostris	Lz	Wz	Lo	Wo	Lav oral	Wav oral	Lav interz	Wav interz
N	18	18	18	18	18	18	15	15
MEAN mm	0.55	0.37	0.13	0.13	0.06	0.03	0.3	0.09
ST DEV mm	0.09	0.04	0.01	0.02	0.01	0.005	0.08	0.02
RANGE min	0.396	0.324	0.108	0.108	0.045	0.027	0.18	0.054
max	0.72	0.468	0.15	0.16	0.09	0.045	0.45	0.108

Celleporaria magnifica (Osburn) 1914
Figs. 136-140 (Smitt MCZ #122)

Holoporella magnifica Osburn, 1914: 216, figs. 22, 23; Osburn, 1940: 455; Osburn, 1947: 44.

Holoporella magnifica Canu & Bassler, 1928b: 143, figs. 7, 8, text-fig. 32.

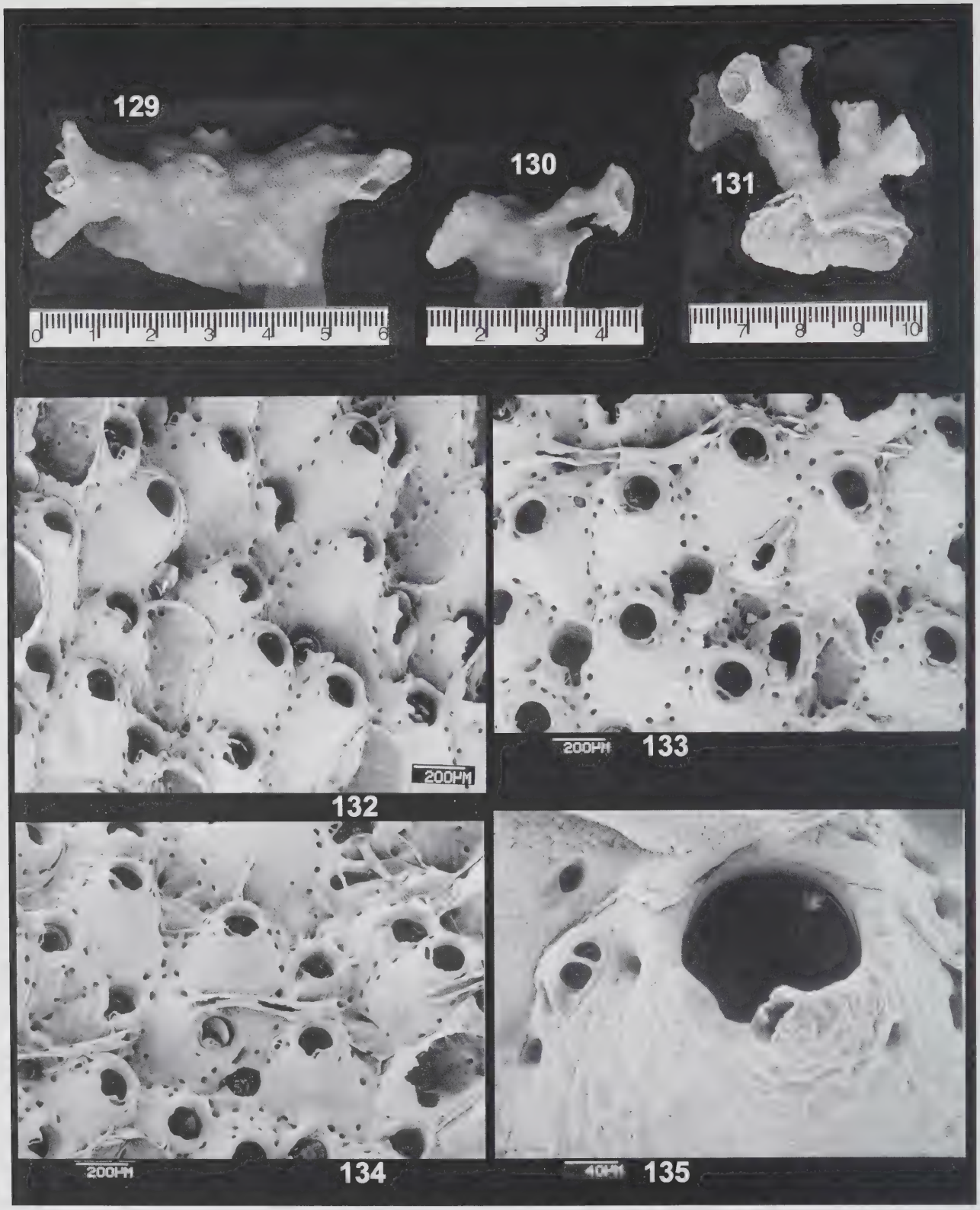
Holoporella magnifica Maturo, 1957: 60, fig. 67, 68.

Celleporaria magnifica Winston, 1986: 13, figs. 23-26.

NOT *Trematooecia magnifica* Cook, 1985: 45, pl. 3b, 19c.

Material Examined: Smitt MCZ #57. *Discopora albirostris* [sample includes material of *C. magnifica* as well as *C. albirostris*] May 1 [4?] 1868. 1D [off Bahia Honda]19f. Smitt MCZ # 122. *Discopora albirostris* [two pieces are *C. magnifica*] Jan. 16, 1869, Casts No. 6 & 7 West of Tortugas, 35 fms. Pourt.

Description: Colony encrusting and multilaminar, forming thick coarse-textured crusts and irregular mounds (e.g., Fig. 136). Brownish orange in life; brown color remaining in dried material. Zooids very large, at growing edge convexly oval in shape, becoming more erect and irregular in shape in frontally budded layers. Scattered marginal pores, sometimes additional pores on the distal edges of zooids close to the orifice, but with the central proximal portion of the frontal wall imperforate and rough to beaded in texture. Frontal wall calcification rising to a thick and projecting umbo and avicularian rostrum at one side of the proximal edge of a low thick peristome, its small upright and round-mandibled avicularium directed toward the lateral margin of the zooid. Orifice semi-circular, its proximal edge straight to slightly convex (Fig. 139), with no notch or sinus. Large raised spatulate interzooidal avicularia, varying in size and shape (e.g., Figs. 138 and 139) are scattered among autozooids. The medium sized group are narrowly spatulate, the large ones more broadly spatulate, their rostra raised at an angle to the colony surface, their zooids also showing marginal pores. Ovicell imperforate, its shape an open hood.



Figures 129-135. *Celleporaria albirostris* (Smitt) 1873 (= *Discopora albirostris* of Smitt). Fig. 129. Large tubular colony. Smitt MCZ # 123. Fig. 130. Smaller tubular colony. Smitt MCZ # 123. Fig. 131. Another colony. Smitt MCZ # 123. Fig. 132. Group of autozooids, showing subcircular orifice with suboral umbos and avicularia. Smitt MCZ #83. Fig. 133. Another group of zooids, note interzooecial avicularium. Smitt MCZ #83. Fig. 134. Group of zooids, interzooecial avicularium visible in upper right. Calcified tubes are not part of bryozoan colony. Smitt MCZ #83. Fig. 135. Close up of zooid, showing secondary orifice with suboral umbo and avicularium and small interzooecial avicularium near zooid margin. Smitt MCZ #83.

Discussion: Although Smitt's 1873 description of *Discopora albirostris* forma *typica* (p. 70), and his illustrations of that species do clearly refer to *albirostris*, two of the MCZ samples included specimens of another *Celleporaria* species, unrecognized by Smitt. This species was later described from the Tortugas by Osburn (1914). The coarse texture created by its very large zooids make *C. magnifica* the most easily identified of the Caribbean *Celleporaria*. In addition, although its orifice shape is similar to that of *C. albirostris*, it lacks the white-spined, prickly appearance given to *albirostris* colonies by the sharp pointed avicularian rostra. Scolaro (1968) reported *C. magnifica* from the Miocene Chipola formation of Florida Cook (1985:145) listed *Trematooecia magnifica* (Osburn) from Ghana, but her illustrations show a species much more like *Trematooecia aviculifera* than Osburn's *C. magnifica* from the Tortugas.

Distribution: Cape Hatteras to Florida, Caribbean, and Gulf of Mexico.

Celleporaria magnifica	Lz	Wz	Lo	Wo	Lov	Wov	Lav small	Wav small	Lav large	Wav large
N	12	12	12	12	6	6	12	12	12	12
MEAN mm	0.88	0.67	0.23	0.24	0.34	0.46	0.07	0.06	0.52	0.24
ST DEV mm	0.1	0.08	0.02	0.02	0.03	0.04	0.01	0.01	0.12	0.06
RANGE min	0.63	0.54	0.198	0.216	0.288	0.414	0.054	0.054	0.324	0.108
max	1.044	0.792	0.27	0.27	0.36	0.54	0.09	0.072	0.648	0.306

Celleporaria sherryae, new species
Figs. 141-142 (Smitt MCZ No. 135) Figs. 142a-d (VMNH No. 1628.00)

Holoporella vagans Canu & Bassler, 1928b: 148, Plates 25, figs. 7-13; text Figure 33 e-g. NOT *Cellepora vagans* Busk 1885: 198, Pl. XXIX, Fig. 10, Pl. XXXV, Fig. 11.
Celleporaria subalba Winston, 1986: 14, figs. 31-35.

Holotype: VMNH no.1628.00. *Celleporaria sherryae*. On dead oyster shell from intertidal rocks on south side of South Beach Route AIA bridge, Fort Pierce, St. Lucie Co., Florida, 11 April 2000, J. E. Winston coll.

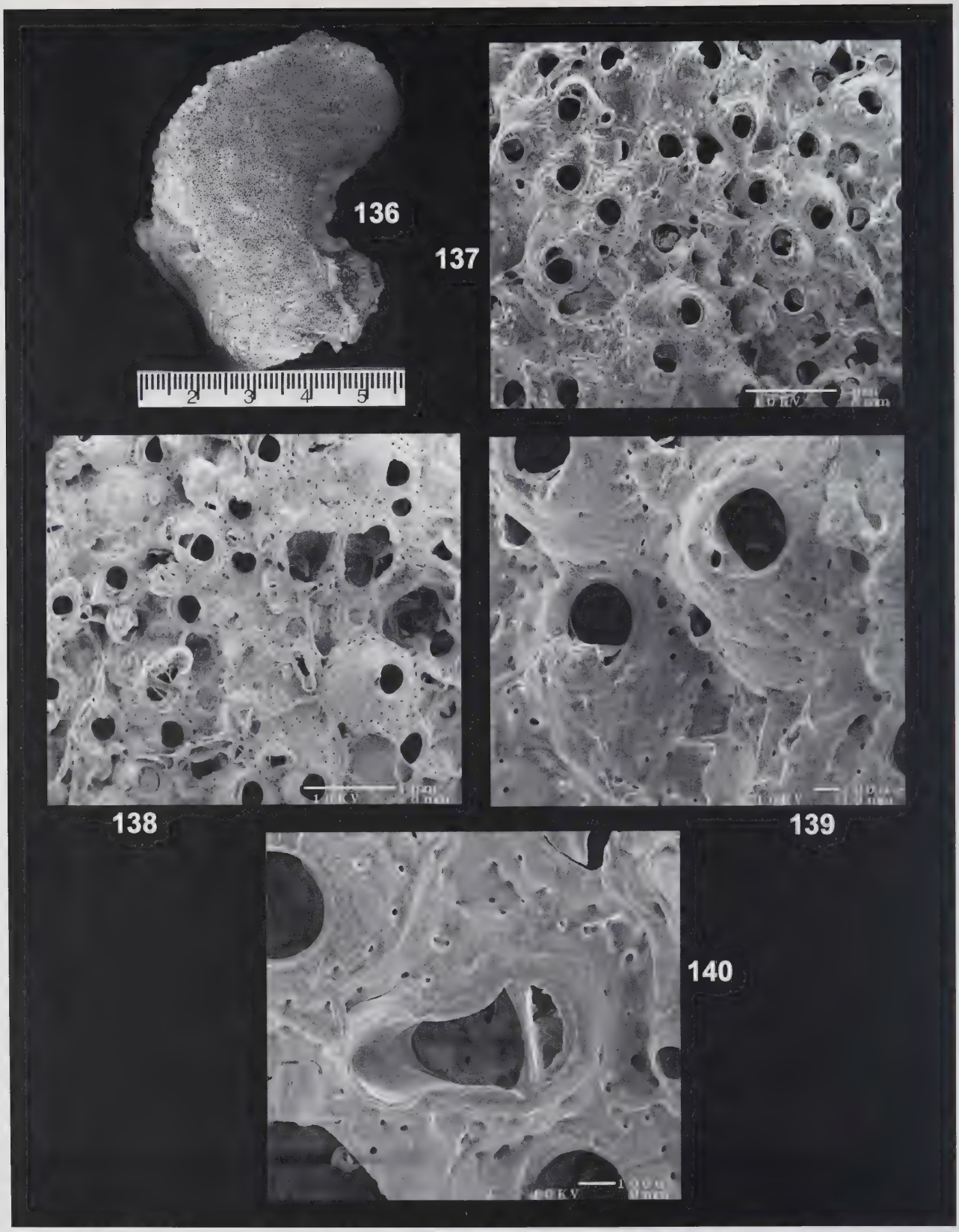
Material Examined: MCZ # 135. [labeled] *Cellepora avicularis*. March 21, 1869, Off Elbow Reef, Cast no. 3, 49 fms. *Holoporella vagans*. USNM Plesiotype 7531. Atlantic, 40 fm, Fowey Light, 15 m, S. Miami, Florida. *Holoporella vagans*. Bermuda, the Reach, 1936, det. R.C.O. Osburn Coll. Acc. No. 208837. *Holoporella vagans* Busk 8910. Honolulu, Type, Challenger (this specimen is the real *vagans*, a portion of Busk's type material, obtained by exchange with British Museum (N.H.). *Holoporella subalba* C&B, USNM Co-types. 7529. Alb. Sta. 2362, East of Yucatan. (Two species are mixed in the box, but the majority of material matches their description of *subalba*). USNM 7528. *Holoporella subalba* C&B, Alb. Sta. 2363, East of Yucatan. VMNH no. 2819.00. *Celleporaria sherryae*. Cape Florida, Key Biscayne, Dade Co., Florida, beach drift, J. E. Winston 18 July 2002. VMNH no. 2326.00. *Celleporaria sherryae* rock, S. Side of Fort Pierce Inlet, Fort Pierce, St. Lucie Co, Florida, J. E. Winston, 21 July 1999. VMNH no. 3087. *Celleporaria sherryae*. Fort Pierce Inlet, south side of beach near Historical Museum, beach drift, Fort Pierce, St. Lucie Co., Florida. J. E. Winston, 14 July 2002.

Etymology: This species is named in honor of Sherry Reed, in recognition of her 20 years employment with the Smithsonian Marine Station, Fort Pierce. Sherry has provided laboratory and field support for Smithsonian and visiting scientists from all over the world, cheerfully taking on the challenges of research projects covering the whole spectrum of marine life. She has also served as the marine station's dive officer, in which capacity she has gracefully weathered stormy seas, poor visibility, and projecting egos.

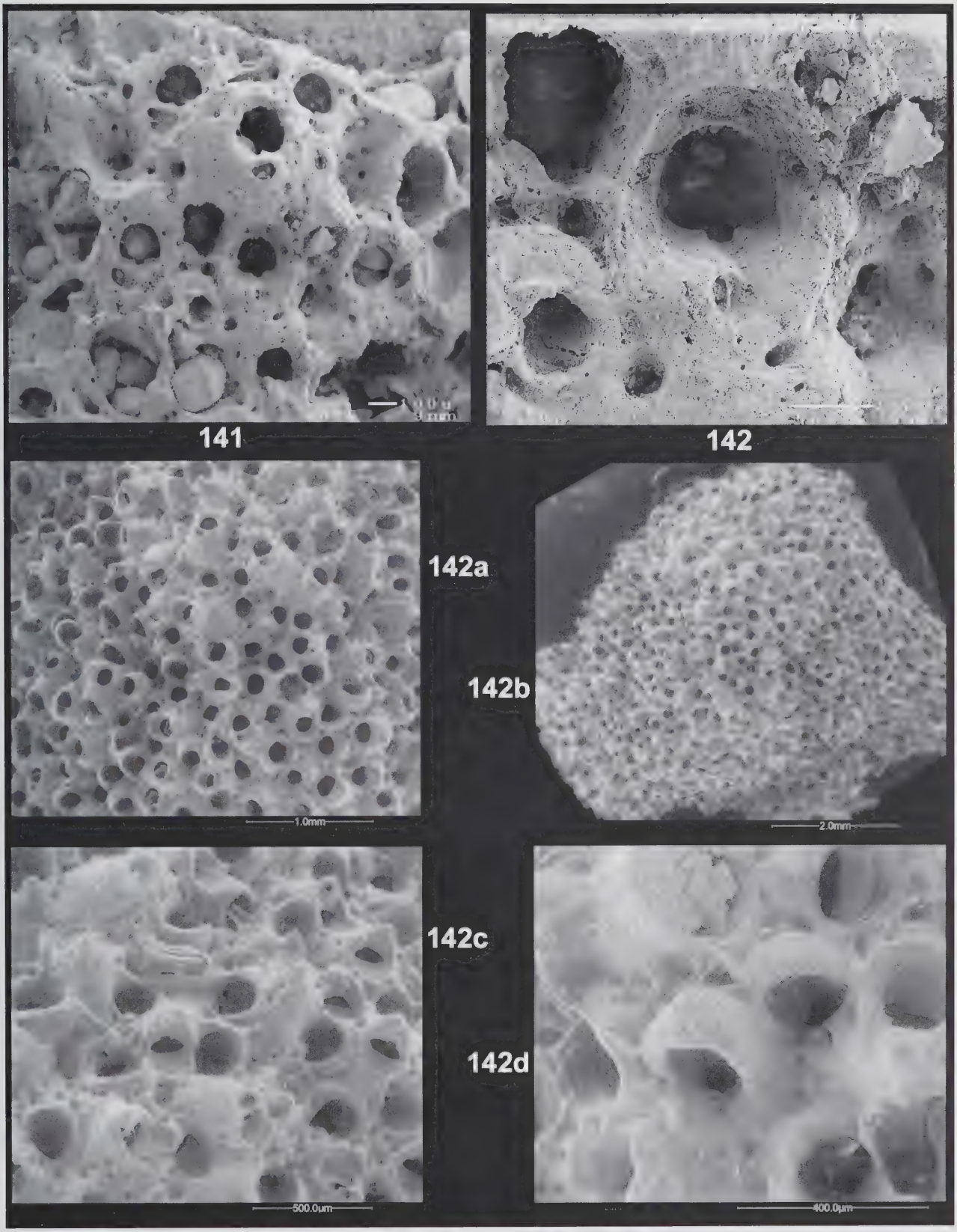
Diagnosis: Celleporaria having a grayish pink to white color when live, light colored chitinous parts, a zooid orifice withone large U-shaped and one small very shallow sinus, four oral spines, a suboral mucro with avicularium, a frontal wall with only marginal pores, large raised and tilted sub-triangular, spatulate avicularia, and a small hood-like ovicell.

Description: Colony encrusting and multilaminar, grayish pink to white in color, with light colored opercula and avicularian mandibles. Zooids oval to subrectangular at growing edge, erect and jumbled, irregularly polygonal in frontally budded regions of the colony (fig.142a). Frontal wall granular to beaded in texture, imperforate except for a row of medium-sized marginal pores. The orifice is semi-circular, its proximal margin slightly bowed, with a single large, shallow U-shaped off-center sinus, and a very shallow adjacent notch (fig.142b). The low peristomial rim is raised proximally into a rough textured umbo supporting an oval avicularium with a toothed rostral rim; this is set at about a 60^0 angle and aimed laterally and slightly proximally. Distinctive large, sub-triangular, spatulate avicularia with a raised and thickened rostrum and body, the mandibles raised at about a 30^0 degree angle above the colony surface, are scattered among the zooids (e.g., Winston, 1986: fig. 32). Ovicells are open imperforate hoods with the same beaded or granular calcification as autozooids(fig.142c).

Celleporaria sherryae	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	0.48	0.36	0.13	0.15
ST DEV mm	0.08	0.06	0.01	0.01
RANGE min	0.396	0.306	0.117	0.135
max	0.594	0.486	0.153	0.162



Figures 136-140. *Celleporaria magnifica*. Fig. 136. Life size colony from Smitt MCZ # 122. Fig. 137. Group of large, frontally budded zooids. Smitt MCZ # 122. Fig. 138. Another group of zooids showing two sizes of spatulate interzooecial avicularia. Fig. 139. Close up of two zooids, to show semicircular, un-notched shape of orifice and shape and position of suboral avicularium. Fig. 140. Close-up of large spatulate avicularium.



Figures 141-142. *Celleporaria sherryae*. Smitt MCZ # 135. Fig. 141. Portion of this dead, abraded colony showing orifices of several zooids (some blocked by sand grains). Fig. 142. Close up of orifice showing, sinus, suboral avicularium and four orificial spine bases.

Discussion: MCZ # 135, labeled *Cellepora avicularia*, but with *C. ramulosa*? crossed out, is a very worn and abraded specimen of a *Celleporaria* species (Fig. 141). Enough structure remains to show the single-notched orifice and the shape and angle of the suboral, rostral avicularia (Fig. 142) These match the description Canu & Bassler's description of *Celleporaria vagans* and correspond with their USNM material labeled "*vagans*" from the region. However, they are quite different from *Celleporaria vagans*, Busk's species from Hawaii (Busk 1885), a dark-olive colored species which like, *C. sherryae*, has zooids with a granular frontal wall texture and only marginal pores, as well as an orifice with a single sinus. However, *Celleporaria vagans* lacks the mucronate suboral avicularium. It has the tubular peristome and the variety of large avicularia (include one with duckbill mandible) as described and illustrated by Busk (Pl. XXIX, Fig. 10). I have also misidentified this species (Winston 1986, p. 14, Figs. 31-35), confusing it with Canu & Bassler's *Celleporaria subalba* (Canu & Bassler 1928b: 146, pl. 25, Figs. 1-6, text-fig.33b). Examination of the type material of *C. subalba* shows it to be species with an orifice with no sinus, and no suboral rostral avicularia, but a with a noticeably projecting proximal rim to the orifice (as shown their Pl. 25, figs. 2-4). No spines were detected on their specimens or mentioned in their description, whereas *C. sherryae* has four spines (e.g., fig. 142)..

There are probably several *Celleporaria* in the Western Atlantic/Caribbean region with single-notched orifices, including the *C. mordax* of Marcus (1937), and the group definitely needs more study. However, because the above species is very common in shallow water and fouling communities in the region and has been incorrectly identified in the past, it seemed appropriate to take the opportunity to describe it here, despite the poor condition of the one Smitt specimen. The species is well-illustrated in Winston 1986 (figs. 31-35) under the name *Celleporaria subalba*.

Distribution: Florida, Caribbean, Gulf of Mexico.

Family Romancheinidae Jullien, 1888

Genus *Hippopleurifera* Canu & Bassler, 1927

Hippopleurifera mucronata (Smitt) 1873
Figs. 143-145 (Smitt MCZ #22)

Hippothoa mucronata Smitt, 1873: 45, pl. VIII, fig. 169.
Hippomenella rubra Canu & Bassler, 1928b: 108, pl. 10, fig. 7, text-fig. 19c.
Hippomenella mucronata Osburn, 1947: 33.
Hippopleurifera mucronata Shier, 1964: 628.

Material Examined: Syntype. Smitt MCZ #22. *Hippothoa mucronata.* May 20, 1868, 4 RM, 29 fm. Pourt. Smitt mentions two colonies from 29 fms., encrusting dead shell. The one specimen in the Smitt MCZ collection forms a nodular encrustation on the convex surface of a piece of dead shell. It still retains its coral red color. A small colony of *Trypostega striatula* (live at the time of collection) is overgrowing one edge. On the concave surface of the shell is a dead colony of *Reginella floridana*, some of which has been overgrown by the *Hippopleurifera*. USNM MATERIAL EXAMINED: *Hippomenella rubra* Canu & Bassler. Holotype. USNM no. 7516, *Albatross* Stat. 2405, 28°45'N, 85°2' W, 30 m, Gulf of Mexico. *Hippopleurifera mucronata* Havana, Cuba, Albatross Stat. 2319 [no cat. no.], *Hippomenella rubra.* Alb. Stat. 2319, North of Cuba. 23°10'37"N, 82°20'6"W, 143 fm. USNM 10206. *Hippomenella rubra.* C&B Alb. Sta. D2362, East of Yucatan USNM 10204.

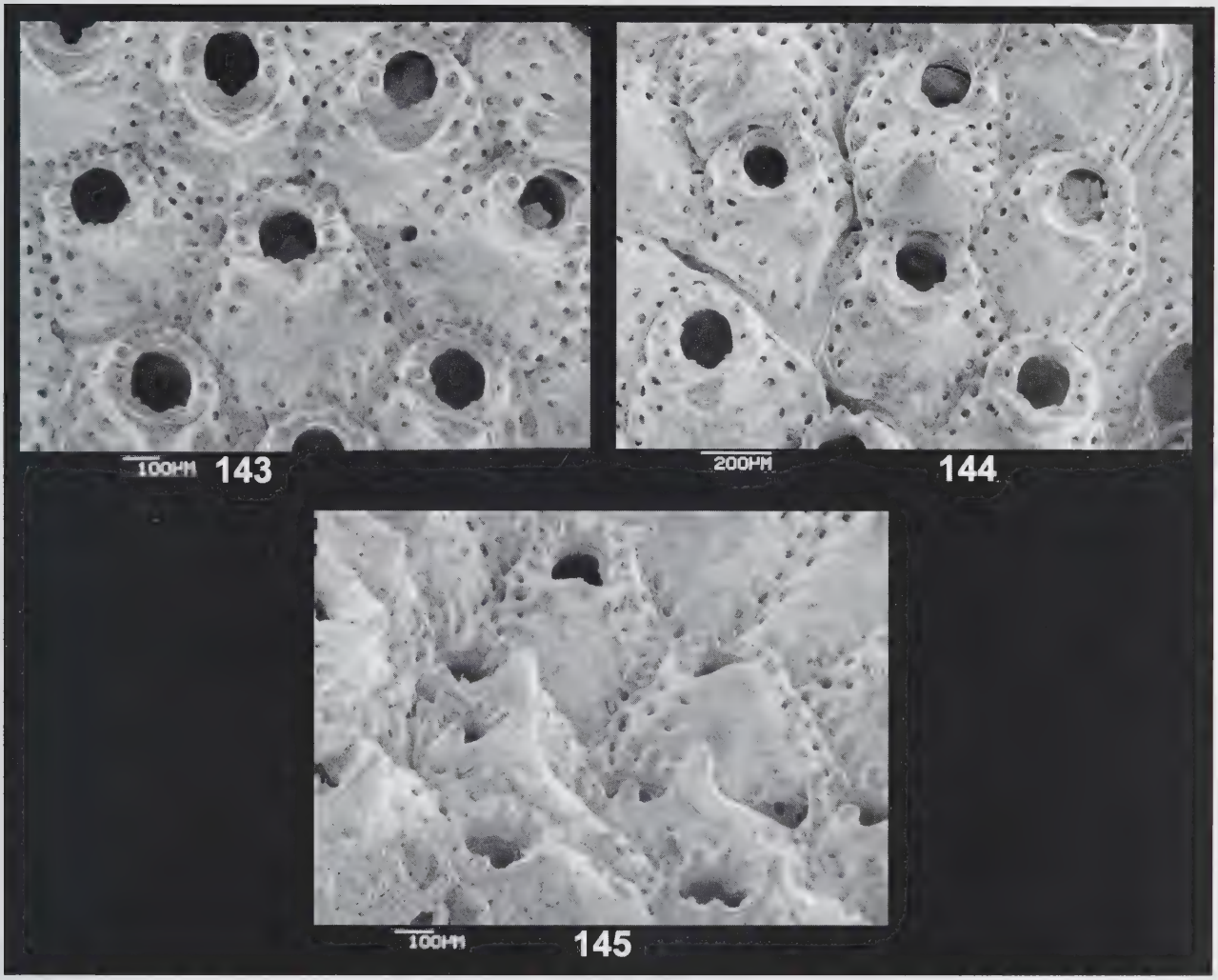
Description: Colonies, orange red to brownish-red in color (red color present not only in dried material, but even in the calcarous skeleton of dead specimens) and encrusting in one or more layers. Zooids are rhomboidal in shape with a row of marginal pores and a less complete inner row of pores whose inner edge may be elongated in grooves, giving a faintly ribbed appearance to the central imperforate area of the frontal wall. The frontal wall is raised distally into a peristomial collar around the orifice. This collar is flattened distally and laterally and bears 6 (usually) or 7 projecting spines; proximally it is raised into a pointed umbo (Fig.145). The orifice is cleithridiate, its anterior portion almost elliptical, the sides curving down proximally to two small rounded condyles which demarcate a shallow U-shaped sinus.The Smitt specimens lack avicularia . The ovicell is globose, with marginal pores between ribs of calcification radiating outward from a pointed central tubercle (Fig. 144).

	Lz	Wz	Lo	Wo	Lov	Wov
N	6	6	6	6	6	6
MEAN mm	0.54	0.43	0.14	0.11	0.25	0.3
ST DEV mm	0.06	0.04	0.01	0.01	0.02	0.01
RANGE min	0.504	0.378	0.126	0.108	0.234	0.288
max	0.666	0.486	0.144	0.126	0.27	0.324

Discussion: Canu & Bassler (1928b: 108, pl. 10, fig. 7) described *Hippomenella rubra*, a very similar (in their words "very close, perhaps identical") species from the Gulf of Mexico (at Albatross Stn. D 2405, 30 fms., 28° 45' N, 85° 02' W, March 15, 1885 (south off Appalachicola area, outer part of shelf). They distinguished it from *mucronata* by its possession of long, narrow curved-pointed avicularia on some zooids, and a proximal, rather than central tubercle on ovicells. Examination of USNM material indicate that *rubra* and *mucronata* do indeed belong to the same species, and Smitt's name has priority. Winston (1984) described another Recent species from Belize, *Hippopleurifera belizae*, and several fossil species have been described from the Tertiary of the southeastern U. S. and Caribbean region (Canu & Bassler 1920, 1923; Cheetham 1963).

Distribution: Cape Hatteras to Florida, Caribbean, Gulf of Mexico. The species has been reported only once in the Caribbean (Aruba and Gulf of Venezuela, Osburn, 1947) and

Gulf of Mexico (Florida, Shier 1964). However, Maturo (1968: 281, fig.8) found it to be one of the most common species encrusting shell litter off the S. E. coast of the U.S. from Cape Hatteras to Florida, and especially common off the Georgia coast, found in almost every sample. It may well be a common shelf species throughout the region. According to Osburn (1952: 301-303) the species also occurs from Baja California to the Galápagos, and Soule & Soule (1961) list it from the Gulf of California.



Figures. 143-145. *Hippopleurifera mucronata* Smitt MCZ # 22. Fig. 143. Group of zooids, showing peristomial collar with 6-7 projecting spines. Fig. 144. Group of zooids, including an ovicelled zooid. Fig. 145. Group of zooids in side view to show projecting proximal umbo of peristomial collar.

Family Tessaradomidae Jullien, 1903

Genus *Tessaradoma* Norman, 1869

Tessaradoma boreale (Busk)1860
Figs. 146-154 (Smitt MCZ #164, #52, #61)

Onchopora borealis Busk, 1860a: 213, pl. 28, figs. 6-7.
Tessaradoma boreale Smitt, 1873: 32, pl. VI, figs. 143-145; Hayward & Ryland, 1999: 182, fig. 68C, D, fig. 69.
Tessaradoma gracile (Sars 1863) Canu & Bassler, 1928b: 86, pl. 15, fig. 5; pl. 28, fig. 6; Osburn, 1940: 416.

Material Examined: Smitt noted (p. 32) that Pourtalès collected it at "twenty different localities". The MCZ Smitt collection has 20 samples, although some represent different dredge hauls at very close to the same locality. #6. *Anarthropora borealis* [and *Cellepora tuberosa*]. May 2, 1868, #3 D[redging] [off Sombrero] 183 fms. Pourt. #12. *Anarthropora borealis*. May 1, 1868, 7# D[redging] [off Sombrero] 111 fms. Pourt. #32. *Anarthropora borealis* May 11, 1868, 5th D[redging] [off Sand Key] 82 fms. Pourt. #33. May 11, 1868 ,7th

D[redging] [off Sand Key] 103 fms. Pourt. #37. *Anarthropora borealis* 1868. [no other data]. # 41. [not identified]. With *Cellepora margaritacea*. May 11, 1868, tth D[redging] [off Sand Key] 82 fms. #45. *Anarthropora borealis* May 11, 1868, 11 D[redging] [off Sand Key] 128 fms. #50. *Anarthropora borealis* (May 11?) 1868, 11 D[redging] [off Sand Key] 116 fm. #51. *Anarthropora borealis* May 4, 1868, 11 D[redging] [off Bahia Honda] 176 fm. #52. *Anarthropora borealis* May 2, 1868, 3 D[redging] [off Sombrero] 183 fm. #61. *Anarthropora borealis* May 16, 1868, 4 D[redging] Off Sandy Key 120 fm. Pourt. #68. *Anarthropora borealis*. May 8, 1868. Cast No. 10. Off Alligator Reef, 188 fms Pourt. #91. *Anarthropora borealis*. March 4, 1868. Cast No. 1, Off Cojima, Cuba. Pourt. #99. *Anarthropora borealis*. March 10, 1869. Cast No. 2, Off Double Headed Shot Key, 471 fm. Pourt. #117. *Anarthropora borealis*. Feb. 11, 1869. Cast No. 3, S. of Marquesas, 140 fm. #129. *Anarthropora borealis*. February 11, 1869. Cast No. 2, S. of Marquesas, 132 fm. #133. *Anarthropora borealis* Feb. 17, 1869. Cast No. 3, SW of Sand Key, 138 fms. #142. *Anarthropora borealis* [attached tag: *Tessaradoma boreale*. No other data]. #164. *Anarthropora borealis*. May 1, 1868, Dredge No. 3, Off Sombrero, Fla 183 fathom. #171. *Anarthropora borealis*. May 1, 1868, Dredging [off Sombrero] 183 fm. USNM 7609. *Tessaradoma gracilis* var. Sars. Alb. Sta. D 2117, Caribbean Sea. USNM7605. Plesiotype. *Tessaradoma boreale* Smitt *gracilis* Sars. Lesser Antilles, Alb. STA D2753 (C&B 1928b, pl. 15, fig. 5). USNM 242575d. *Tessaradoma boreale*. Alb. 1884, STA 2117. 683 fms. [Treatise, pt. G, Rev. 1983, p. 189, Fig. 83-2]. USNM 242574. Near Geroges Bank. Capt. Chas. A. Anderson. [Treatise, pt. G, Rev. 1983, p. 189, Fig. 83-2].

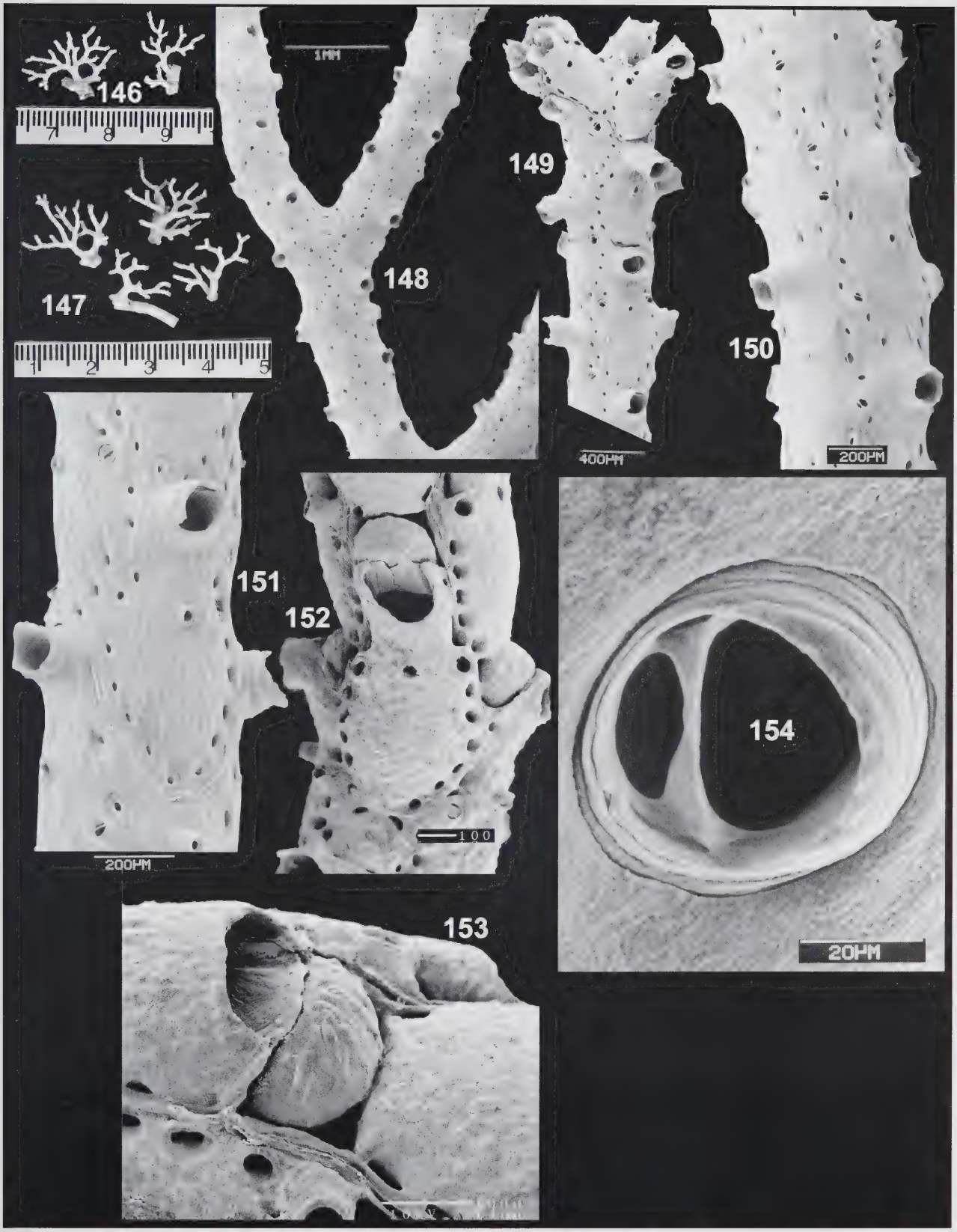
Description: Colony consisting of white, erect, rigid branches, arising from an encrusting base (as shown in Smitt, 1873: VI, fig. 143). Zooids initially elongate oval in shape, arranged back to back in alternating pairs along the cylindrical branches. Primary orifice semicircular, hidden inside a long curved tubular peristome. Secondary orifice at end of peristome, round, but often with jagged edges, and with a rim of pustulose calcification. Frontal wall calcification at first granular and pustulose (at growing tips, Fig. 149), becoming thickened and striated, with a row of marginal pores (Figs. 150-151). On the frontal wall below the peristome there is a round spiramen, often embedded in a short calcified tube. Small oval avicularia, with complete cross bar, a semicircular mandible, and a slightly raised rostrum (Fig.154) are scattered along zooid margins. They develop from marginal pores. As zooids age, they become broader and thicker with secondary calcification, their margins less apparent. Ovicells are spherical, faintly striated, and imperforate, opening into the peristome (Figs. 152-153), and like zooids, become immersed in secondary calcification.

Discussion: Cheetham (1972) summarizes the distributional pattern of living and fossil species of this genus. Smitt's specimens show a somewhat pustulose calcification on zooids at growing tips (Fig.149). This calcification changes with age into wavy striated texture (Fig. 151) on zooids, but the pustulose to beaded texture remains around peristomes in older regions of the colony, although they eventually become worn or embedded. Canu & Bassler 1928b, p. 87, point out the range in size in zooid characters for the species as given in publications by various authors. They note that their Caribbean specimens are the largest and that "They appear to constitute a variety" but they do not name the variety. Examination of USNM specimens show Caribbean specimens twice as long as NE specimens. Further study may show the Caribbean and Florida material to be a distinct species, or part of a species complex, however, as it appears to be distributed along the entire eastern U.S. continental shelf from New England to Florida (Maturo 1968), further study seems required.

Distribution: A deep water N. and S. Atlantic species. Distributed from the Arctic to the equator, its depth distribution apparently temperature controlled (2-13° C), it occurs in deeper water closer to the equator (Cheetham 1972, Hayward & Ryland 1999). In the W. Atlantic it is found both N. and S. of Cape Hatteras (Maturo 1968). In addition to Pourtalès' collections from The Florida shelf and off Cuba, it has been recorded from Puerto Rico, and the Lesser Antilles.

Tessaradoma boreale	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav	Or-Spir.*
N	24	24	24	24	6	6	24	24	24
MEAN mm	0.8	0.41	0.11	0.13	0.13	0.21	0.05	0.04	0.16
ST DEV mm	0.06	0.06	0.01	0.01	0.01	0.03	0.01	0.01	0.03
RANGE min	0.72	0.306	0.09	0.108	0.108	0.18	0.036	0.036	0.108
max	0.99	0.54	0.144	0.162	0.144	0.27	0.072	0.054	0.216

*Distance from proximal edge of orifice to spiramen.



Figures. 146-154. *Tessaradoma boreale*. Fig. 146. Colony fragments with bases, life sized (Smitt MCZ #. 45?) Fig. 147. More colony fragments showing bases attached to calcareous tubes (Smitt MCZ # 50 or 51?). Figure 148. Section of branch fragment, showing bifurcations (Smitt MCZ # 61). Fig. 149. Young zooids at growing tip of branch (Smitt MCZ # 61). Fig. 150. Zooids in side view, showing marginal pores and small avicularia (Smitt MCZ # 61). Fig. 151. Close-up of autozooid (Smitt MCZ # 61). Fig. 152. Close-up of ovicelled zooid. (Smitt MCZ # 68). Fig. 153. Close-up of ovicell (Smitt MCZ # 68). Fig. 154. Close-up of avicularium. (Smitt MCZ # 61).

Infraorder Lepraliomorpha Gordon, 1989

Superfamily Smittinoidea Levinsen, 1909

Family Smittinidae Levinsen, 1909

Genus *Parasmittina* Osburn, 1952

Parasmittina betamorphaea new species
Figs. 155-160 (Smitt MCZ # 54)

Escharella landsborovii Smitt, 1873: 60, pl. X, fig. 201 [possibly]. NOT fig. 202.

Parasmittina trispinosa Maturo, 1957: 55 (in part). NOT fig. 62. NOT *Discopora trispinosa* (Johnston), 1838: 222.

Smittina trispinosa var. *nitida* Osburn, 1912: 246; Marcus, 1937: 104, Est. XXI, fig. 56. NOT *Discopora nitida* Verrill, 1879: 195 [at least in part– not *nitida* (A)].

Parasmittina nitida morphotype B Maturo & Schopf, 1968: 41, fig. 120; Humphries, 1975: 20, pl. 4; Winston, 1982: 142, fig. 71.

Holotype: Smitt MCZ # 54. *Escharella jacotini*, *Escharella landsborovii* [and *Hippothoa spongites*]. Jan. 11, 1868, Tortugas, 13 fm. Pourt.

*Other material examined:*VMNH no. 3005.00 Walton Rocks, South Hutchinson Island, St. Lucie Co., Fl. J.E. Winston July 2002. 2938, Avalon Beach North Hutchinson Island, St. Lucie Co. Fl. J.E. Winston, July 2002.

Diagnosis: Parasmittina having two orificial spines, and a round orifice with a broad lyrula and curved dentate condyles, surrounded by a raised peristome. Avicularia variable, including oval and acute frontal avicularia and occasional giant interzooecial avicularia. Ovicell with two rows of pores.

Etymology: Because this species was known for many years as *P. nitida* morphotype B, it is here given a latinized version of that name: *betamorphaea*, a combination of beta, the Greek letter B, morphe (f), = form (Greek) and (-aeus, -a, -um), Greek adjectival ending = belonging to.

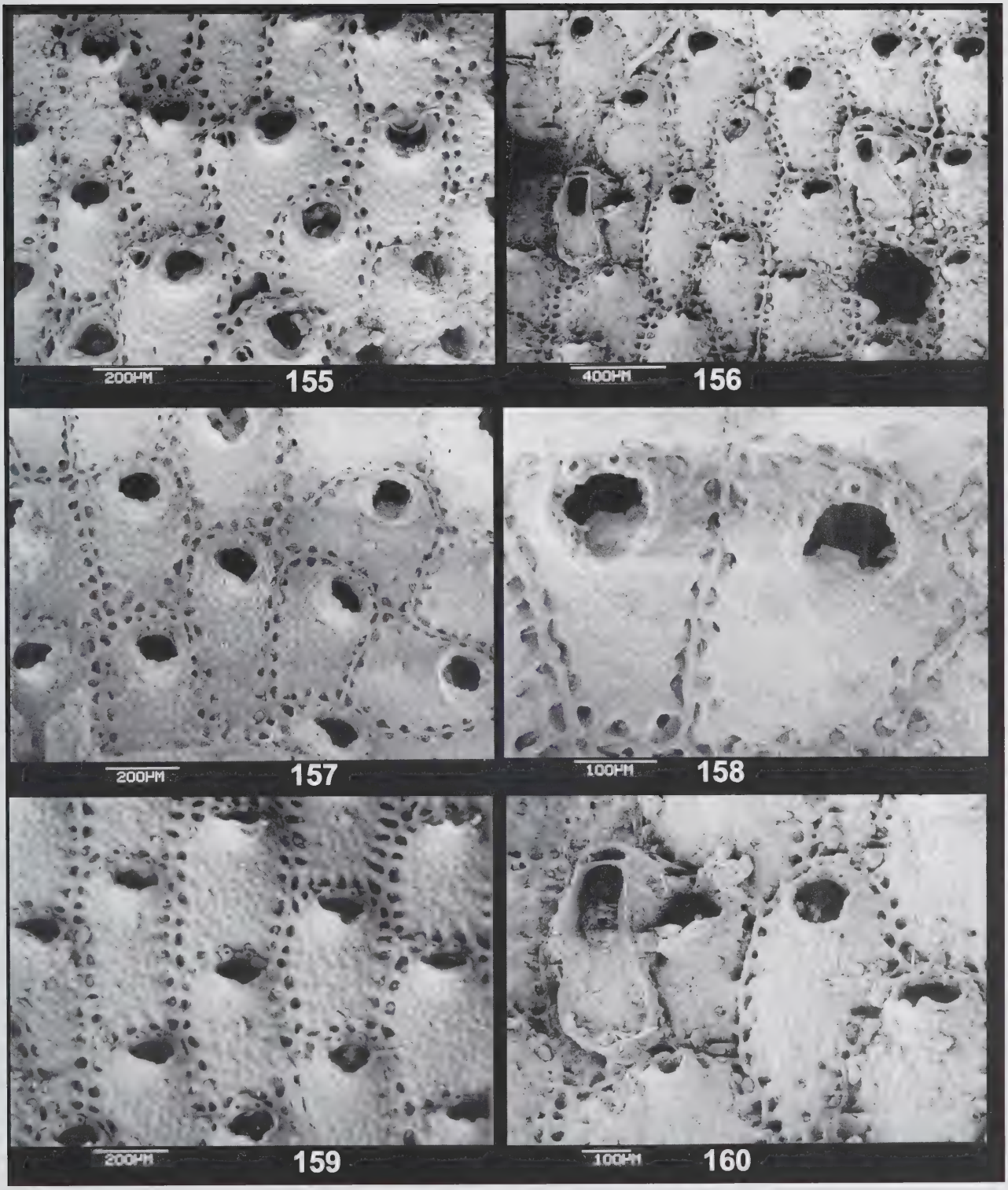
Description: Colony encrusting in one or more layers, color white to yellowish. Zooids quadrate, frontal wall coarsely granular and imperforate centrally, with a row of large marginal pores. Primary orifice round distally, with two curved, and dentate condyles and a wide lyrula (Fig. 152). Two spines (e.g., Figs. 158, 159) on distal edge of primary orifice. Orifice surrounded by raised collar which may have lappets on each side and/or a proximal umbo (Fig. 155). Avicularia variable, 0 to 3 per zooid. Acute avicularia (with pointed mandibles) are placed lateral to the orifice (usually extending up onto the collar), on the distal or lateral side of the orifice. Oval avicularia are located lateral or proximal to orifice (opposite acute avicularia, if both occur), and variously oriented. Giant interzooidal avicularia (Figs. 165, 160) may occasionally occur. Ovicells (only two present in Smitt MCZ material) are prominent, hyperstomial, with top and sides covered with granular calcification, and frontal surface with two rows of pores. Pinkish-orange embryos.

Discussion: In the western Atlantic several species seem to have been identified as *Parasmittina trispinosa*. None of them are the cool temperate N. E. Atlantic species whose characteristics and range are discussed in Hayward & Ryland (1999). Maturo & Schopf (1968) discussed and described two of them: *Parasmittina nitida* morphotype A, is a species first described and figured by Verrill (*Discopora nitida* Verrill, 1879: 195). This species is common along the northeast coast of the U. S. from Cape Cod to Cape Hatteras. They also described a second "morphotype", which is common along the southeastern U. S. coast from Cape Hatteras to Florida. Later genetic work showed the differences between the two morphotypes are inheritable, indicating that both are good species (Maturo 1973, Humphries 1975), but the species represented by their morphotype B was never given a separate name.

The two colonies of *Parasmittina* in MCZ Smitt #54 may be part of the material Smitt discussed under *Escharella landsborovii*, but the matter is not clear, as his discussion lumps several species, and two names that might refer to them are written on the label of #54. His Fig. 201 may show this species; the orifice and lyrula are appropriate, as is the general shape of the secondary orifice, and one oral spine is visible on a zooid, but none of his illustrated material is from #54. Neither of the two *Parasmittina* colonies in this sample is large, and both are broken, abraded, and coated with debris, obviously not living at the time the sample was taken. Neither species is Smitt's *P. spathulata*. They both appear to belong to *P. nitida* morphotype B, as named and described here. Fig. shows a group of zooids, with two orificial spines and small acute and oval avicularia, Fig. 158 an orifice in which can be seen the characteristic broad lyrula and one down-curved condyle, and Fig. 160,one of the giant interzooidal avicularia.

Distribution: Cape Hatteras to Brazil. Caribbean.

Parasmittina betamorphaea	Lz	Wz	Lo	Wo	Lov	Wov	Lav small	Wav small	Lav large	Wav large
N	6	6	6	6	2	2	6	6	2	2
MEAN mm	0.47	0.29	0.08	0.1	0.2	0.2	0.09	0.05	0.36	0.19
ST DEV mm	0.08	0.03	0.01	0.01	0.03	0.03	0.04	0.004	0.05	0.01
RANGE min	0.378	0.252	0.072	0.09	0.18	0.18	0.072	0.045	0.324	0.18
max	0.576	0.324	0.09	0.108	0.216	0.216	0.162	0.054	0.396	0.198



Figures 155-160. *Parasmittina betamorphaea*. Smitt MCZ # 54. Fig. 155. Group of zooids, note small triangular avicularia. Fig. 156. Another group of zooids, showing two large spatulate avicularia. Fig. 157. Group of zooids. Fig. 158. Two zooids, showing orifice and lyrula. Fig. 159. Group of zooids showing peristome and two distal spines. Fig. 160. Close-up of large spatulate avicularium.

Parasmittina spathulata (Smitt) 1873
Figs. 161-163 (Smitt MCZ #76)

Escharella jacotini var. *spathulata* Smitt, 1873: 60, pl. X, figs. 199, 200. NOT *Escharella jacotini* Smitt, 1867: 11.

Parasmittina trispinosa var. *spathulata* Osburn, 1914: 208.

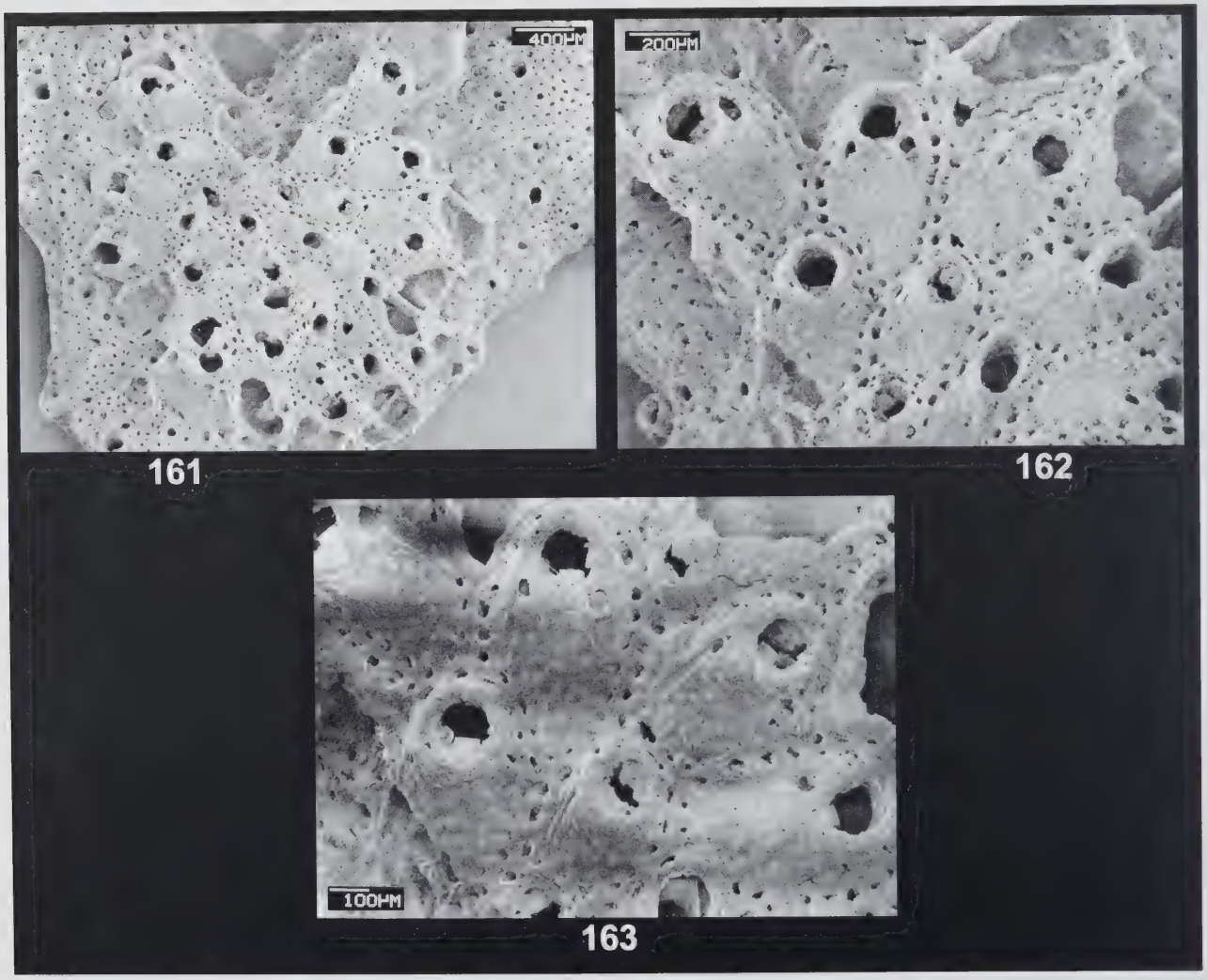
Smittina trispinosa spathulata Canu & Bassler, 1928b: 114, pl. 15, figs. 9-13, text-fig. 21; Osburn, 1940: 435. NOT *Discopora trispinosa* Johnston, 1838: 222.

Parasmittina spathulata Cheetham & Sandberg 1964: 1037, figs. 44-47; Rucker 1967: 830, fig. 16a; Long & Rucker, 1970: 20, fig. 4:5; Winston, 1982: 142, Fig. 70.

Material Examined: MCZ Smitt # 76. *Escharella jacotini* on *Porina serrulata* [ink label]. April 3, 1869. Cast No. 3. Off French Reef, 44 fms. Pourt.

Description: Colony encrusting on hard substrata. Zooids subrectangular, variable, often rounded distally, but with sharp proximal edges. Frontal surface flat, coarsely granular and imperforate centrally, with a row of large marginal pores. Orifice subcircular, with short condyles and medium-sized truncate lyrula. A low peristome, raised laterally, partly hides the condyles. Two to four oral spines (Smitt shows four on the young colony of Fig. 199), soon covered by secondary calcification. Avicularia variable in size, position, and number, usually one long pointed, proximally directed avicularium, toward lateral edge of frontal wall below orifice; there may be another shorter one on other side of orifice. Larger spatulate avicularia (as in Smitt, 1873: fig. 199, for example) may also occur. Ovicell prominent, hyperstomial, with tops and sides covered with granular calcification, and front surface having numerous irregularly spaced pores (e.g., Fig.70,Winston 1982).

Measurements: No measurements could be made on this specimen. It was a very broken skeletal colony which disintegrated further in the SEM. Measurements for Florida specimens from the Indian River area (subtidal-shelf): LZ= about 0.6, WZ= about 0.4 mm, and this is in agreement with measurements for this species based on the SEM scale bars.



Figures *161-163. Parasmittina spathulata.* Smitt MCZ # 76. Small partially abraded colony encrusting branch of *Colatooecia serrulata.* Fig. 161 Entire colony. Fig. 162. Group of zooid showing position of avicularia. Fig. 163. Close-up to show shape of orifice and lyrula.

Discussion: A number of *Parasmittina* species occur in the tropical Western Atlantic, but their diversity was not recognized by early workers, who either tried to identify them with known European species (e.g., Smitt), or accounted for their differences by "variability" (e.g, Osburn, 1914: 208, "variation of the secondary characters of this species here as in many regions occurs to a bewildering extent."). It was not until the scanning electron microscope came to be used (e.g., the pioneering study by Soule & Soule, 1973) and ultrastructure characters of orifice, spines, lyrula, avicularia, ovicells, etc. could be seen and studied in detail, that their true diversity came to be appreciated. The MCZ Smitt material does not include the specimens Smitt illustrated. Although the labels of three containers (#s 54, 76, 126) in the MCZ collection list *E. jacotini*, on box #126 the name has been crossed out, #76 was a worn and broken young specimen with no spines or ovicells and only trace impressions of avicularia remaining, as is shown in Figs. 161-163. On #54 (see next entry) neither of the two *Parasmittina* colonies present is *P. spathulata*, thus the problem cannot be solved on the basis of the MCZ Smitt collection. Examination of the rest of Smitt's material in the Naturhistoriska Museet, Stockholm might resolve this question. Soule & Soule (1973) and Winston (1984) discuss *P. spathulata* and the possibility of its synonymy with *P. areolata* (Canu & Bassler 1927). Osburn (1952) listed *P. spathulata* from the Galapagos, but his illustration (pl. 49, figs. 12-14) shows a *Parasmittina* with a different suite of distinguishing characters, probably an undescribed species.

Distribution: Western Atlantic: Cape Hatteras to Caribbean and Gulf of Mexico.

Parasmittina floridana, new species
Figs. 164-170 (Smitt MCZ # 11)

Holotype: Smitt MCZ #11. *Escharella linearis* affinis and *Hippothoa biaperta* [=*Schedocleidochasma cleidostoma*]. Jan. 18, 1869. Cast No. 3, S. W. of Tortugas, 60 fms. Pourt.

Diagnosis: Parasmittina species having an orifice with beaded distal rim and anvil-shaped lyrula as well as both triangular proximally or proximo-laterally directed and oval-spatulate, laterally directed frontal avicularia.

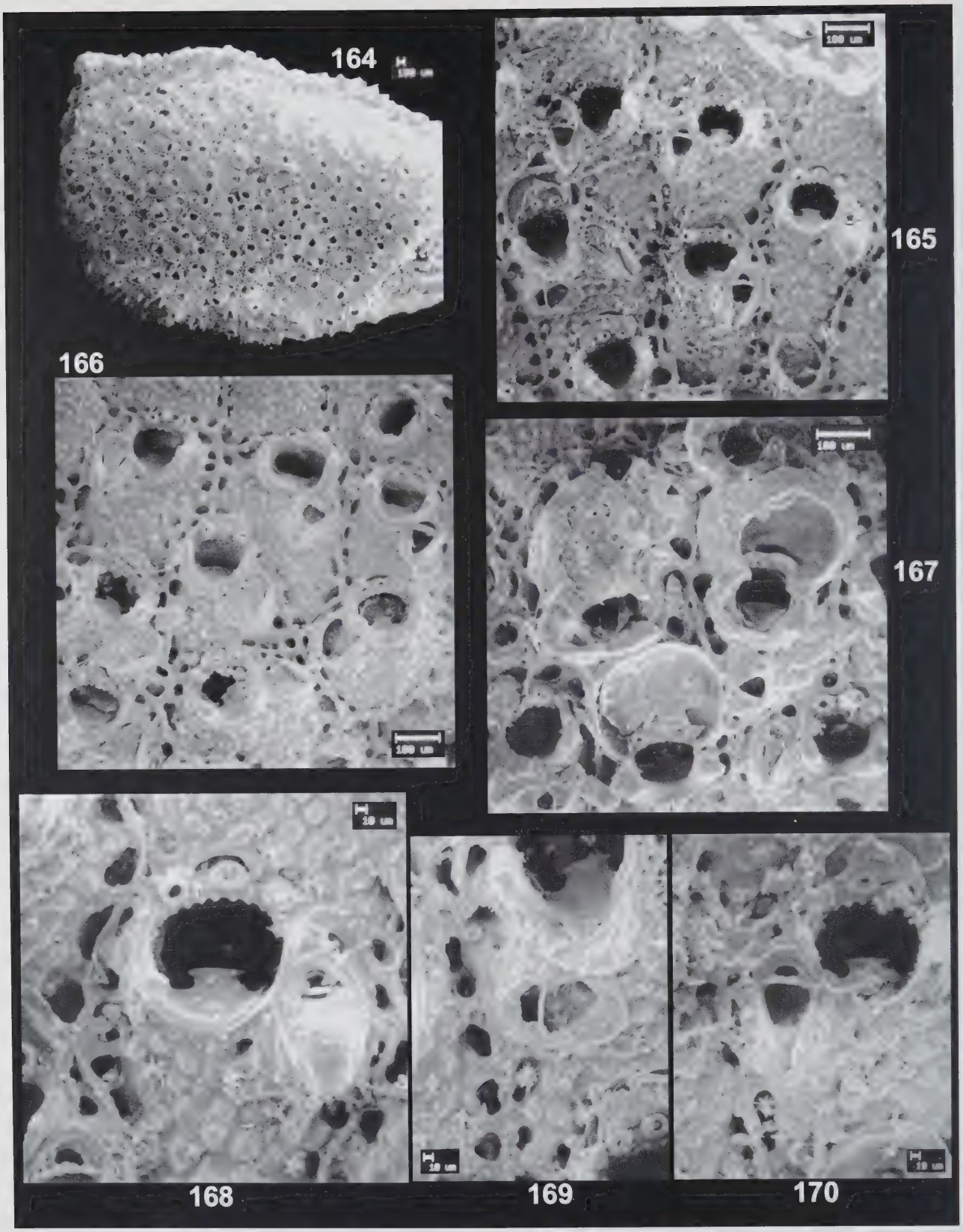
Etymology: floridana, after the state in which it was collected.

Description: Colony encrusting. Zooids sub-hexagonal to irregularly polygonal, with a convex frontal surface with a rough, mostly imperforate surface made up by large round bumps of calcification, but having a row of large marginal pores and a few small pores connected to avicularia. The orifice is large relative to zooid size, with an anvil-shaped lyrula proximally, two sharp down-facing condyles and a closely beaded distal rim (Fig. 168). Above the distal rim are three spines, and the orifice is surrounded by a low peristome that is laterally raised into two lappets. No giant avicularia were noted, at least in this colony, but triangular proximally or proximo-laterally directed (Figs. 165, 166, 170) and oval-spatulate, laterally directed (Fig.169) frontal avicularia both occur. Ovicells globular, prominent, their distal halves with a number of pores (Fig. 167).

Discussion: Although Smitt's label identified this specimen as "*Escharella linearis* affinis", he did not discuss or illustrate the specimen in his paper, nor does this distinctive species appear to have been described elsewhere. Although there is only one colony in the Smitt MCZ collection, it is well preserved and includes all the characters necessary for description. The advent of SEM has made it possible to distinguish species of *Parasmittina* that had previously been lumped under just a few names. Distinctions have been based largely on differences in sizes, shapes, and orientation of avicularia. Distinctions in orifice shape and morphology of lyrula and condyles have also been considered, but the presence or significance of a smooth or beaded distal rim to the orifice does not seem to have been considered as a potential diagnostic character. At least one other *Parasmittina* species, *Parasmittina serrula*, described by Soule & Soule (1973) from Hawaii, also has an orifice with beading on the distal rim at least when young (Soule & Soule, p.388, and barely visible on upper right zooid in their Fig. 3F). One undescribed *serrula*-like species also occurs in the Caribbean (Jamaica and Belize) and likewise has a beaded orifice, but the beads of calcification are spaced further apart than in *floridana*, and the two species have very different suites of avicularia.

Distribution: Florida Keys.

Parasmittina floridana	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	6	6	6	6	6	6	6	6
MEAN mm	0.57	0.42	0.12	0.12	0.37	0.22	0.19	0.09
ST DEV mm	0.06	0.03	0.01	0.01	0.03	0.01	0.02	0.01
RANGE min	0.45	0.378	0.108	0.108	0.324	0.198	0.162	0.09
max	0.612	0.45	0.126	0.126	0.414	0.234	0.198	0.108



Figures 164-170. *Parasmittina floridana* new species. Holotype Smitt MCZ # 11. Fig. 164. Entire encrusting colony. . Fig. 165. Group of zooids, showing triangular and oval interzooecial avicularia. Fig. 166. Another group of zooids, with triangular avicularia. Fig. 167. Three ovicells, two incomplete. Fig. 168. Close-up of orifice, showing narrow lyrula and serrated distal rim. Fig. 169. Small, ovoid-spatulate avicularium. Fig. 170. Triangular avicularium.

Family Phylactelliporidae Bassler 1953

Genus *Phylactellipora* Bassler 1953

Phylactellipora aviculifera (Osburn) 1914
Figs. 171-173 (Smitt MCZ # 54)

Phylactella collaris var. *aviculifera* Osburn, 1914: 213, fig. 21.
Smittina (sensu lato) thrincota Shier, 1964: 637, fig. 10; Long & Rucker, 1970: 20, fig. 5:4.
Phylactellipora aviculifera Winston, 1982: 142, fig. 72.

Material Examined: Smitt MCZ no. 54. Inside label reads *Hippothoa spongites Escharella jacotini, Escharella landsborovii* miniscule. Jan. 11, 1868, Tortugas, 12 fm. Pourt. VMNH no.2929.00 *Phylactellipora aviculifera,* Avalon beach, North Hutchinson Island, St. Lucie Co. Florida J. E. Winston 15 July 2002. No. 3013.00. South Lido Beach, Lido Key, Sarasota Co. Florida, J.E.Winston 22 July 2002.

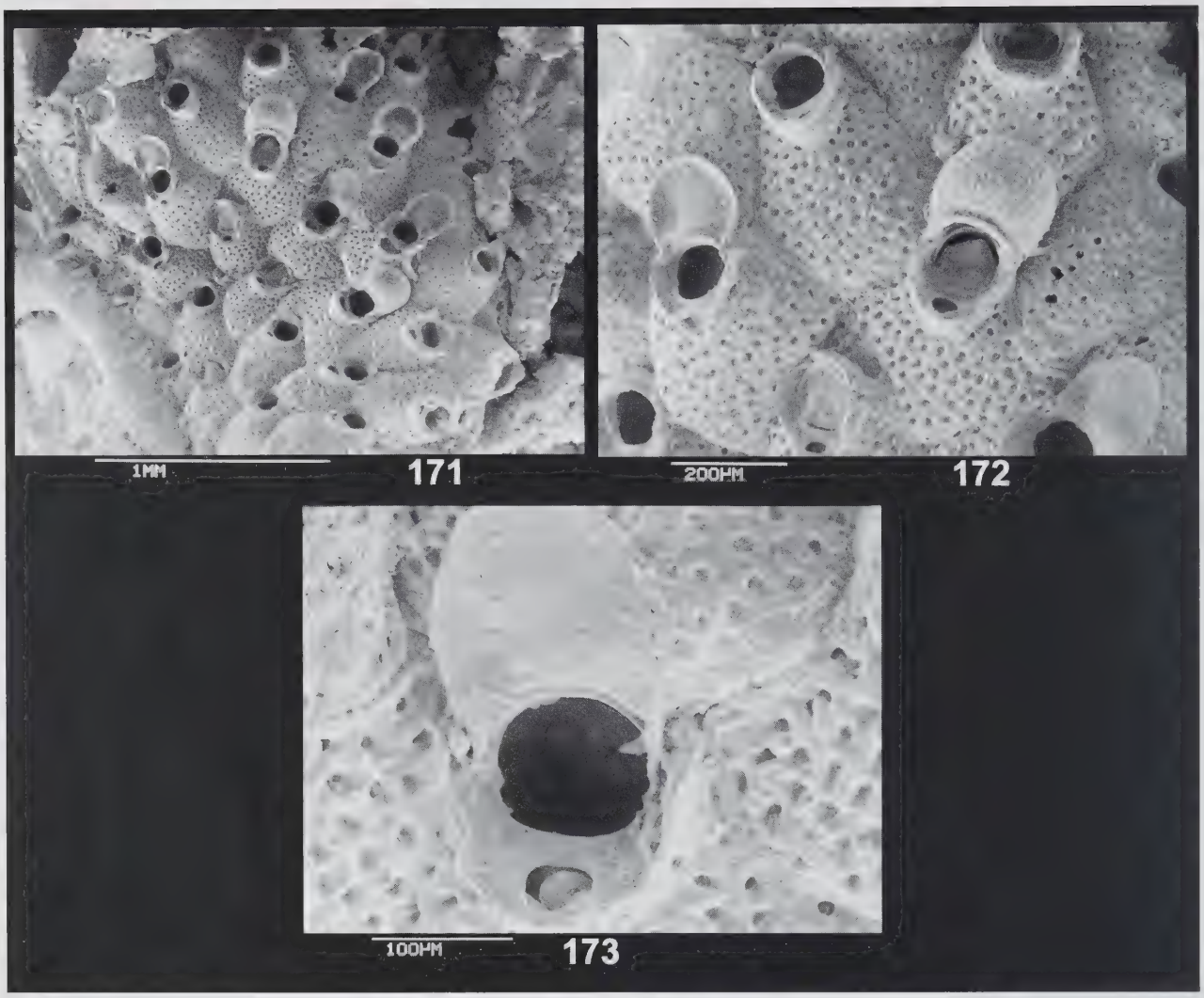
Description: Colony encrusting, white in color. Zooids subhexagonal. Frontal wall convex, its calcification granular and evenly porous. Orifice hoof-shaped, semicircular distally, narrowing proximally to two pointed condyles at the junction with the shallowly D-shaped proximal portion (Fig. 173). Around the orifice is a peristomial collar in the form of sharp edged lappets on the sides, merging into a wider subtriangular proximal shelf. In the center of the shelf is a small avicularium-like chamber, but this chamber has a membranous frontal wall and no mandible (Fig. 173). Ovicell helmet-shaped with a flared proximal rim and imperforate granular calcification. Its opening is independent of the operculum, and its rim connects with the distal edge of the peristome. Embryos yellowish-brown.

Discussion: Smitt does not seem to have recognized this species, of which only one specimen occurs in the Smitt MCZ collection. It is encrusting on a shell along with *Stylopoma spongites* and two *Parasmittina* colonies (see *Parasmittina betamorphaea* above), and Smitt's label indicates he may have thought it to be a small *Parasmittina*. It is small; the colony is only about 1.5 by 2.5 cm in size (Fig. 171), but SEM study shows it to be a sexually mature *Phylactellipora* with two completed and several developing ovicells (Figs. 172-173). The label *Escharella landsborovii* minuscule does not seem to indicate a "variety", or it would be minuscula in Latin, "somewhat or rather small".

The species was described from the Tortugas by Osburn (1914). Shier (1964) gave a new name to northwest Florida material, thinking that the Florida Atlantic material had avicularia (as Osburn had claimed in his original description), but in fact it does not. Both Smitt's and Indian River area specimens have only the membrane-fronted peristomial chambers.

Distribution: Florida (Atlantic coast, Gulf coast, Tortugas).

Phylactellipora aviculifera	Lz	Wz	Lo	Wo	Lov	Wov
N	6	6	6	6	6	6
MEAN mm	0.42	0.34	0.1	0.09	0.18	0.19
ST DEV mm	0.04	0.05	0.01	0	0.02	0.01
RANGE min	0.36	0.27	0.09	0.09	0.144	0.18



Figures 171-173. *Phylactellipora aviculifera*. Smitt MCZ # 54. Fig. 171. Most of colony. Fig. 172. Group of zooids, with ovicells, or developing ovicells. Fig. 173. Close-up of orifice and membranous roofed chamber in peristome.

Family Bitectiporidae MacGillivray, 1895

Genus *Hippoporina* Neviani, 1895

Hippoporina caribaea new species
Figs. 174-178, Smitt MCZ # 87

Escharella pertusa Smitt, 1873: 55 (not figured). NOT *Cellepora pertusa* Esper, 1796: 149, pl. 10, figs. 1, 2.

Hippodiplosia pertusa Canu & Bassler, 1928b: 106, pl. 9, fig. 6; pl. 32, fig. 10; Osburn, 1940: 430; Cheetham & Sandberg, 1964: 1041, text-fig. 54; Shier, 1964: 632.

Hippoporina americana Long & Rucker, 1970: 2, fig. 4:1 [maybe?] (NOT *Lepralia americana* Verrill, 1875: 414).

Holotype: Smitt MCZ #87. *Escharella pertusa* [with *Porina plagiopora*]. Jan. 18, 1869. Cast no. 3. W. off Tortugas, 60 fms. Pourt. The specimen present in the MCZ Smitt collection has no ovicells. USNM. *Hippodiplosia pertusa.* Plesiotype 7521. Alb. Sta. D 2362, East of Yucatan.

Etymology: From Caribaeae, adj. caribaeus. = Caribbean. Latinization for the greater Caribbean region in which it occurs.

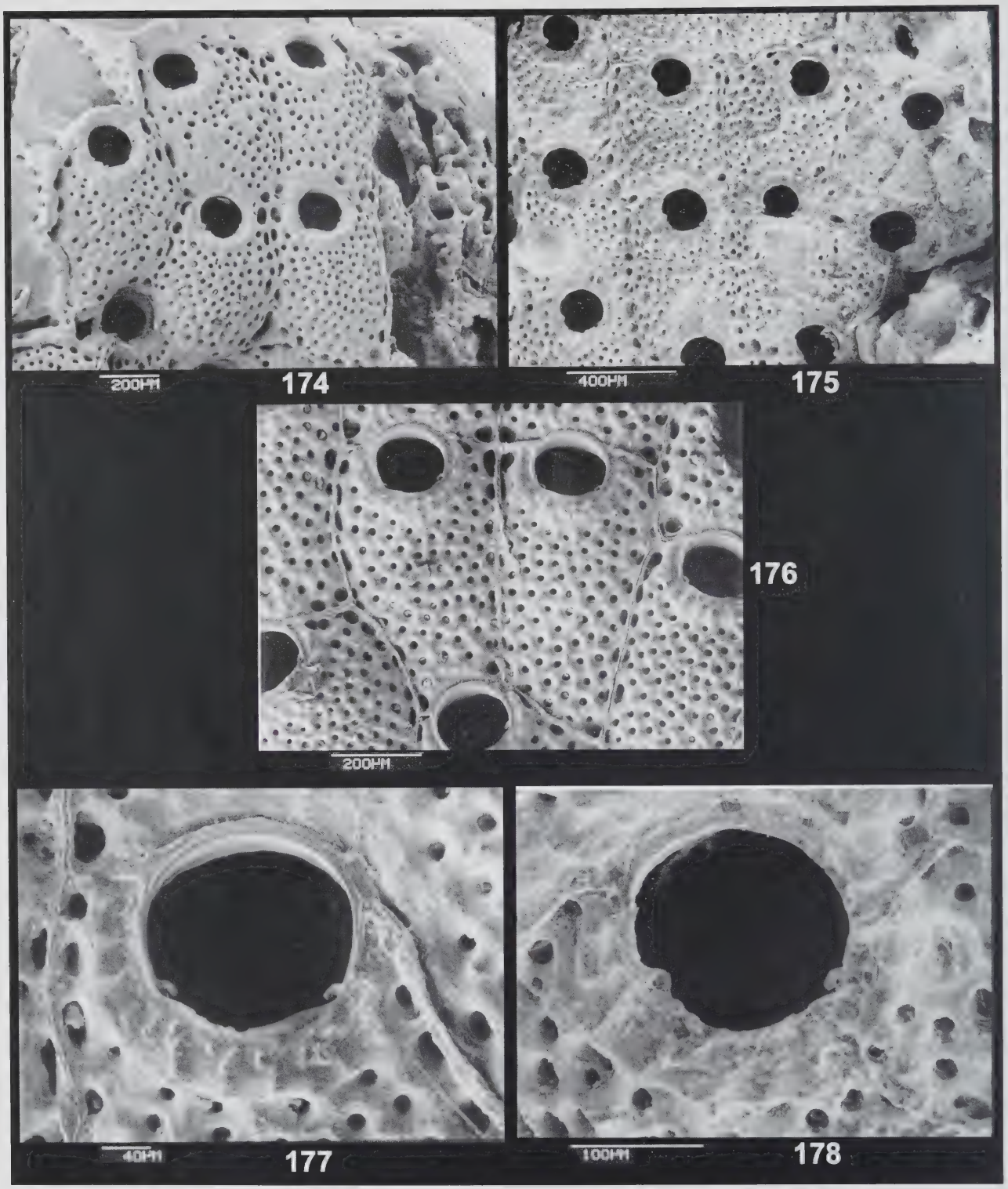
Diagnosis: Hippoporina with large zooids, many small, closely spaced frontal pores, small marginal pores, and no suboral umbo.

Description: Colony encrusting on hard substrata (shell, coral). Zooids rectangular to polygonal, separated from each other by a distinct raised thread of calcification where lateral walls abut. Frontal wall flat to slightly convex, with a granular surface perforated by many small round, closely spaced pores (about 70-95, in Smitt MCZ specimen), as well as larger, and sometimes elongated or irregular marginal pores, giving zooids the appearance of having been hastily basted together with large jagged stitches (e.g., Fig. 176). As secondary calcification proceeds, some of the pores become filled in, and thin threads of calcification which perhaps mark the beginning of a new frontally budded layer may cross zooid boundaries (Fig. 175). Primary orifice hoof-shaped, rounded distally and laterally, with two small rounded to downward-hooked condyles (Figs. 177, 178) just above the outer edges of the shallowly curved proximal border. The primary orifice is surrounded on all sides by a low thick, rough textured peristome with smooth inner and iregular outer margins. No ovicells in the one MCZ colony. According to Cheetham & Sandberg (1964) it is large, moderately convex, irregularly perforated by pores, and becoming overgrown by the walls of adjacent zooids, so that suture lines are visible.

Hippoporina caribaea	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	0.67	0.47	0.14	0.15
ST DEV mm	0.13	0.12	0.01	0.02
RANGE min	0.54	0.324	0.126	0.126
max	0.864	0.648	0.162	0.18

Discussion: Smitt did not illustrate this species, which he believed to be *Hippoporina pertusa* Esper (1796). Authors working in the region have followed Smitt in using the European name for tropical Western Atlantic specimens. However, it is becoming clear that they do not belong to this warm temperate Eastern Atlantic and Mediterranean species. Cook (1985: 158) pointed out that *Hippoporina pertusa* is "part of a multi-species complex of warm and temperate waters which requires further investigation". The use of scanning electron microscopy permits us to differentiate additional members of that species complex. The species described above is one of them. It differs from genuine Eastern Atlantic *Hippoporina pertusa*, the type of the genus, in several ways. *H. caribaea* has almost twice as many frontal pores (70-100+) vs. 39-50 for the *H. pertusa* zooids shown in Hayward & Ryland, 1999: 197, fig. 77. *H. pertusa* zooids do not have the larger marginal pores found in *H. caribaea*. They do have a distinct cruciform suboral umbo, not found in *H. caribaea*. Cook (1964, 1985) described several species of *Hippoporina* from the west African region. *H. caribbea* may be just one of several western Atlantic/Caribbean species. The species described as *H. pertusa* by Marcus (1938: 41, Est. X, fig. 23A-C) has large pointed peristomial lappets and fewer and larger pores. It appears quite similar to the "*Hippoporina americana*" specimens from west Africa described by Cook (1964: 6, text-fig. 1B), and possibly the *Hippoporina americana* of Long & Rucker (1970). They are not the northwest Atlantic species of Verrill. The specimens from Carrie Bow Cay, Belize described by Winston (1984: 19, fig. 39, 40) may also be distinct from *caribaea*. The Belize specimens have fewer more widely spaced pores (but still show some large marginal pores) and a peristome raised into lappets on the sides. They also have occasional suboral, narrow, curved and pointed, laterally directed avicularia. Further investigation is indeed required. Smitt mentioned avicularia. None are present on the MCZ colony–perhaps he mistook the triangular gaps for avicularia.

Distribution: Florida, Gulf of Mexico, Caribbean.



Figures 174-178. *Hippoporina caribaea*. Smitt MCZ # 87. Fig. 174. Group of zooids near growing edge. Fig. 175. Group of more calcified zooids, showing transverse threads of calcification. Fig. 176. Autozooids, showing zooid margins "stitched" by marginal pores. Fig. 177. Close-up of orifice, showing downward projecting condyles. Fig. 178. Another orifice.

Superfamily Schizoporelloidea, 1883

Family Schizoporellidae Jullien, 1883

Genus *Schizoporella* Hincks, 1877

Schizoporella pungens (Canu and Bassler), 1928
Figs. 179-186 (Smitt MCZ # 153)

Hippothoa Isabelleana Smitt, 1873: 44 (In part. figs. 166-167, not fig. 168). Not *Escharina Isabelleana* d'Orbigny, 1839: 12, pl. IV, figs. 13-16.

Schizopodrella isabelleana Smitt Canu & Bassler, 1928b: 96, pl. 27, figs. 1-4.

Schizoporella unicornis Osburn, 1914: 205 (NOT *Lepralia unicornis* Johnston in Wood, 1844: 19.)

Schizopodrella unicornis Osburn, 1920: 4.

Schizopodrella pungens Canu & Bassler, 1928b: 95, pl. 27, figs. 5-12, text-figs. 15 A-C.

Schizoporella ?serialis Banta & Carson, 1977: 395, fig; Winston, 1984: 23, fig. 46-48. [Not *Lepralia serialis* Heller, 1867: 104].

Material Examined: Smitt MCZ no.153. *Hippothoa isabelleana* Smitt. Florida L. F. Pourtales. This appears to be the specimen illustrated by Smitt (Figs. 166, 167). However, it had not grown around coral as Smitt stated, but instead has a much narrower core of some organic material, perhaps a twig, alga, antipatharian or gorgonian skeleton. USNM Cat. no. 7581. *Schizopodrella pungens*. Co-type. Cedar Keys, FLA, in two boxes, material for pl. 27, figs. 5, 7, 8, 9, 11 in one box and specimens for fig. 10, 12 in a second box. Cat. No. 7586. *Schizopodrella pungens* Alb. Sta. 2363. Caribbean Sea, East of Yucatan. Co Type, pl. 27, fig. 6. Cat. No. 7584. *Schizopodrella isabelleana*, St. Thomas, Virgin Islands, W. Indies. USNM [two boxes of dry specimens in bryozoan biologic collection, not cataloged, but labeled in Osburn's handwriting, "*Schizoporella isabelleana* D'Orb. Dry Tortugas, Florida, on piles, encrusting shells, wood and corals", also "*Schizoporella unicornis* det. R. C. Osburn. Spanish Water, Curaçao. S.IV.20, van mangrove wood" USNM acc.no. 208837. VMNH no. *3168.00 Schizoporella pungens*, beach near historical museum, J. E. Winston, 14 July 2003. St. Lucie, Florida. Fort Pierce Inlet, Florida, J. E. Winston, July 2003. VMNH no. 2818. *Schizoporella pungens*, Cape Florida, Key Biscayne, Florida. VMNH no. 2834. *Schizoporella pungens* Coquina Beach, Anna Maria Island, Florida, Gulf of Mexico. VMNH no. 2888. *Schizoporella pungens* Point of Rocks, Siesta Key, Florida, Gulf of Mexico.

Description: Colony encrusting, forming unilaminar to multilaminar masses or developing into cylindrical tubes or foliaceous ruffles. Color of living colonies ranging from pinkish white to violet brown, large colonies typically irridescent brownish purple with a wide band of brownish orange at growing edges. Multilaminar colonies show raised excurrent areas, monticles, their position visible in expanded living colonies as a pattern of darker star-shaped areas where no lophophores are present. Zooids variable in shape, those from the primogenial layers being regular and almost square or rhomboid, those in frontally budded or regenerated areas having more irregular outlines. Borders of zooids delimited by a fine line of calcification. Frontal surfaces flat to somewhat convex, composed of thick, granular calcification which is penetrated by about 40 small evenly distributed circular pores (which may become occluded with increasing calcification) and more irregular and somewhat larger marginal pores. There are no pores in the area just adjacent to the orifice, which sometimes develops into a low peristome as calcification increases. The orifice is semicircular anteriorly, with two small rounded lateral condyles (Fig. 183) and a shallow U-shaped sinus. It is located in the distal corner of the zooid and is usually slightly tilted. Avicularia are single, placed just below and to one side of the orifice, and directed laterally to slightly distolaterally. Mandibles are delicate and triangular in shape, the narrow pointed rostrum sometimes curved (Fig. 185). Avicularia come in a range of sizes, the largest ones associated with the raised zooids of excurrent monticles (e.g., Fig. 184). Ovicells are globular and prominent, perforated by numerous pores. Embryos are bright orange. Ancestrula with 8 spines, and a pale yellow orange polypide with 14 tentacles.

Schizoporella pungens	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.6	0.48	0.13	0.15	0.13	0.06
ST DEV mm	0.03	0.09	0.01	0.01	0.05	0.02
RANGE min	0.576	0.378	0.117	0.126	0.09	0.036
max	0.648	0.63	0.144	0.162	0.216	0.09

Discussion: The thick calcification of this species is deceptive, it is fragile as ice crust, and easily broken. But its growth rate is extremely rapid. Osburn (1914) noted Tortugas colonies that had grown to 1 ½ inches in diameter in less than 2 months. Panels set out at Twin Cays in Belize grew to up to 2 ½ inches in diameter in 6 months or less, while in a 12 day study of recruitment at that site (Nov. 1984) the largest colony had 7 zooids plus the ancestrula.

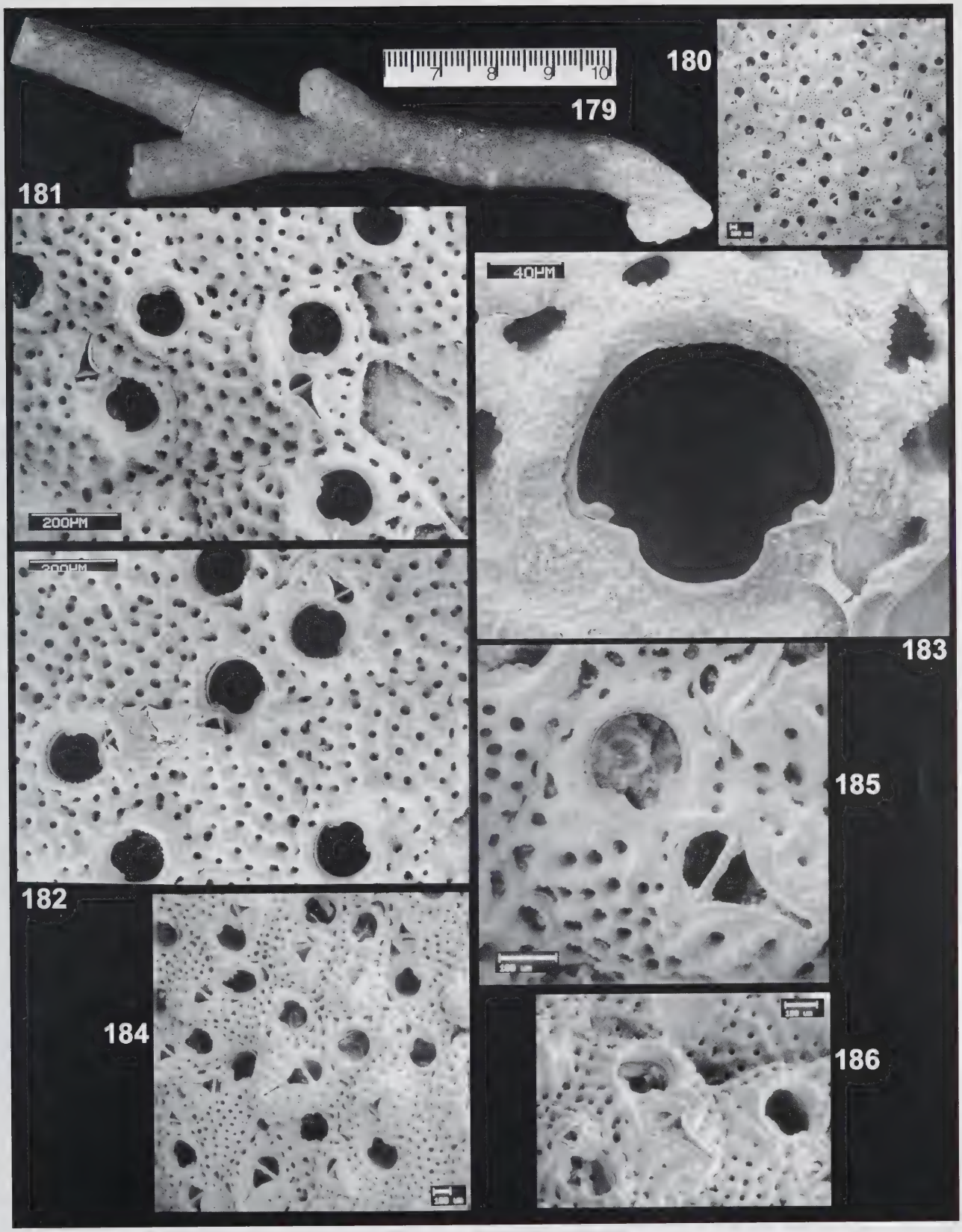
It seems remarkable that this species, with its massive brightly colored colonies, and its preference for shallow water in harbors and bays, attached to mangrove roots, or to man-made structures, should still not have an agreed-upon name. The genus *Schizoporella* includes a number of very successful and widespread fouling species or species complexes. The molecular studies now being carried out will surely clarify a lot of the problems, but the identity of the species described by Smitt can be resolved now. Smitt (who had d'Orbigny's work at hand) used d'Orbigny's name, *Hippothoa isabelleana*. Most d'Orbigny bryozoan names are based on fossils, and their use has caused problems when applied to specimens very distant in time and space from those of his original descriptions. However, in the work in question, *"Voyage dans l'Amèrique Mèridionale", v. 5, pt. 4, "Zoophytes"*, d'Orbigny described several living species from South America. According to his

description (p. 12) *Hippothoa isabelleana* was found encrusting dead shells in the vicinity of Rio de Janeiro, Brazil. His figures show a species with important points of correspondence with the Smitt MCZ specimens and other Caribbean specimens, specifically, 1) the position of the avicularia (below the anter of the orifice) and curvature of one of them, 2) overall frontal wall porosity – spacing and size of pores, 3) porous ovicell, 4) presence of an imperforate rim of calcification around orifice, overall zooid shape consistent with shape of primary layer zooids of Caribbean specimens. There are also differences. The sinus is narrower, and the ovicell smaller relative to zooid size. Marcus studied the bryozoans of Brazil over a 20 year period, describing many species from several areas of the Brazilian coast. His figures and description (Marcus 1937) of *Schizoporella pungens* from Santos (about 500 km south of Rio de Janeiro) show material similar to the Caribbean species, but with a somewhat narrower, though still rounded sinus. He originally used Canu & Bassler's name for his material. He later followed Osburn and other authors of the time in synonymizing all but one of his Brazilian "*Schizoporella*" under *S. unicornis*. Material I recently examined from São Sebastião, São Paulo State, Brazil (about 92 km north of Santos), fit Marcus' and d'Orbigny's material, and both bear a closer resemblance to the Eastern Atlantic-West African *Schizoporella violacea* (Pouyet 1971) in morphology than to Caribbean-Gulf of Mexico specimens.

Osburn's (1914) Tortugas paper had no illustration of the species he called *Schizoporella unicornis*, but his description matches Smitt's Florida material, as does USNM material he identified from the Tortugas . His Curaçao specimens of *Schizoporella unicornis* in the USNM collection also seem to refer to this species, both in terms of morphology and habitat (encrusting mangrove roots and attached mangrove oysters), but in his later papers his descriptions of the variability of "*S. unicornis*" suggest that he might have combined more than one species in his samples (1940: 420, 1947, 28). In their 1928b paper *Fossil and Recent Bryozoa of the Gulf of Mexico Region*, Canu & Bassler described a new species, *Schizoporella pungens*. Examination of their co-types and other Gulf of Mexico material named by Bassler in the Smithsonian collection shows their specimens to agree with Smitt's specimens from Florida, as well as other Caribbean and Gulf of Mexico specimens of the species. Unfortunately, later taxonomists have followed Osburn in the belief that *Schizoporella unicornis* was an extremely variable cosmopolitan species, and using that name rather than the Canu & Bassler name. We now know (see Hayward & Ryland, 1999: 220) that *Schizoporella unicornis* is an Eastern Atlantic species with a range from western Norway to northwest Africa and the western Mediterranean. It is characterized by single or paired distolaterally directed avicularia, a densely porous frontal wall, an imperforate ovicell, and an orifice with a deep V-shaped sinus, with a stout umbo developing just proximal to it.

The problem was made more complicated by the addition of another name, Water's *Schizoporella errata* (Waters, 1878: 11, pl. 1, fig. 9), described from the bay of Naples, but apparently now a cosmopolitan fouling species. But the common Caribbean fouling species, as described above, does not seem to be *Schizoporella errata*, as defined by Hayward & Ryland (1999: 212, figs. 86A-D and 87A-B). Their illustrations show a species with an ancestrula which differs slightly, in terms of orifice shape, and position of spines from that of *S. pungens*, although, like *S. errata* and *S. unicornis*, it has 8 spines, and an imperforate frontal wall. *S. pungens* zooids also have a shorter, broader orifice with a narrower sinus, thicker and blunter small avicularia, and an ovicell which displays radial ridges in its early stages. Neither does Florida material match Cook's (Ghana) *Schizoporella errata* (Cook, 1985: fig. 17C). Her African material has the avicularia in a different position, and at a different angle. *S. isabelleana*, *S. violacaea* and *S. pungens* probably all fall within the *Schizoporella errata* complex, but it seems preferable at this point to use the name given by Canu & Bassler, *Schizoporella pungens*, for Caribbean-Gulf of Mexico material matching the above description. It should be noted, though, that part of the confusion of names in the Caribbean may have occurred because there is more than one "*errata*"-group species occurring in the region.

Distribution: Florida, Caribbean, Gulf of Mexico. On the east coast of Florida *Schizoporella pungens* has expanded its range in recent years and now is found as far north as Fort Pierce Inlet.



Figures 179-186. *Schizoporella pungens*. Smitt MCZ # 153. Fig. 179. entire colony branch, life size. Fig. 180. Group of zooids, with various sized avicularia. Fig. 181. Group of autozooids. Fig. 182. Group of autozooids. Fig. 183. Close-up of orifice. Fig. 184. Another group of zooids showing variation in orifice shape and avicularia size. Fig. 185. Zooid with relatively narrow orifice sinus and large avicularium. Fig. 186. Zooid frontal surfaces, viewed at a low angle.

Genus *Stylopoma* Levinsen, 1909

Stylopoma minuta Canu & Bassler, 1923
Figs. 187-189 (Smitt MCZ # 54)

Hippothoa spongites Smitt, 1873: 42[in part, figs. 162-3?]. NOT *Eschara spongites* Pallas, 1766: 45.
Stylopoma minuta Canu & Bassler, 1923: 104, pl. 3, fig. 8.

Material Examined: MCZ Smitt no. 28. *Hippothoa spongites*. East Key, Florida, 13 fm. March 13, 1868. Pourt. MCZ Smitt no. 54. *Hippothoa spongites, Escharella jacotini, Escharella landsborovii* miniscule. Jan. 11, 1868, Tortugas, 12 fm. Pourt.

Description: Colony encrusting, uni-to multilaminar. Zooids subrectangular in primary layer to irregularly polygonal in frontally budded layers. Calcification granular with irregular tubercles in places, and penetrated by medium-sized pores except around the orifice. Orifice semicircular anteriorly, located at the distal end of the zooid; it may be off-center and slightly tilted, or central and not tilted. Low bar-shaped condyles stretch along the proximal edge of the anterior portion, ending well before the central opening of the teardrop-shaped sinus, so that there is a noticeable central gap (Fig. 187). Distolaterally-directed adventitious avicularia with a rounded base and a triangular mandible, their rostra raised diagonally, are found singly or in pairs below and to one side of the orifice (Fig. 187). Similar avicularia may occur on the proximal portions of zooids, directed laterally or proximo-laterally and may occasionally be found on ovicells (Fig.). The ovicell is very large (1 ½ - 2 times width of autozooids in diameter), globular, and covered by the same pustulose, porous calcification as autozooids (Fig. 187). Short and very broad spatulate vicarious avicularia may also occur (Figs. 188, 189).

Discussion: This species was described by Canu & Bassler on the basis of fossil material from the Bowden Marl of Jamaica. Recent material that is morphologically consistent with this description occurred in the *Stylopoma* studies of Jackson & Cheetham (Jackson & Cheetham 1990, 1994; Cheetham et al. 1993, 1994). Determination of two of the Smitt samples as *S. minuta* was made possible by Alan Cheetham whose assistant, JoAnn Sanner, measured the Smitt MCZ *Stylopoma* specimens and analyzed them along with the material used in the original *Stylopoma* studies. The specimens from #28 and #54 fell into the *S. minuta* group.

Distribution: Florida, Caribbean.

Stylopoma minuta	LZ	WZ	Lo	Wo	Lov	Wov	Lav	Wav
N	6	6	6	6	6	6	6	6
MEAN mm	0.47	0.28	0.10	0.14	0.48	0.49	0.29	0.17
ST DEV mm	0.01	0.02	0.01	0.01	0.04	0.03	0.02	0.02
RANGE min	0.46	0.27	0.10	0.13	0.414	0.45	0.252	0.144
max	0.49	0.30	0.12	0.15	0.522	0.522	0.306	0.198

Stylopoma projecta Canu & Bassler, 1923
Figs. 190-195 (Smitt MCZ # 127)

Hippothoa spongites Smitt, 1873: 42[in part, figs. 161]. NOT *Eschara spongites* Pallas, 1766: 45.
Stylopoma projecta Canu & Bassler, 1923: 103, pl. 45, fig. 6.

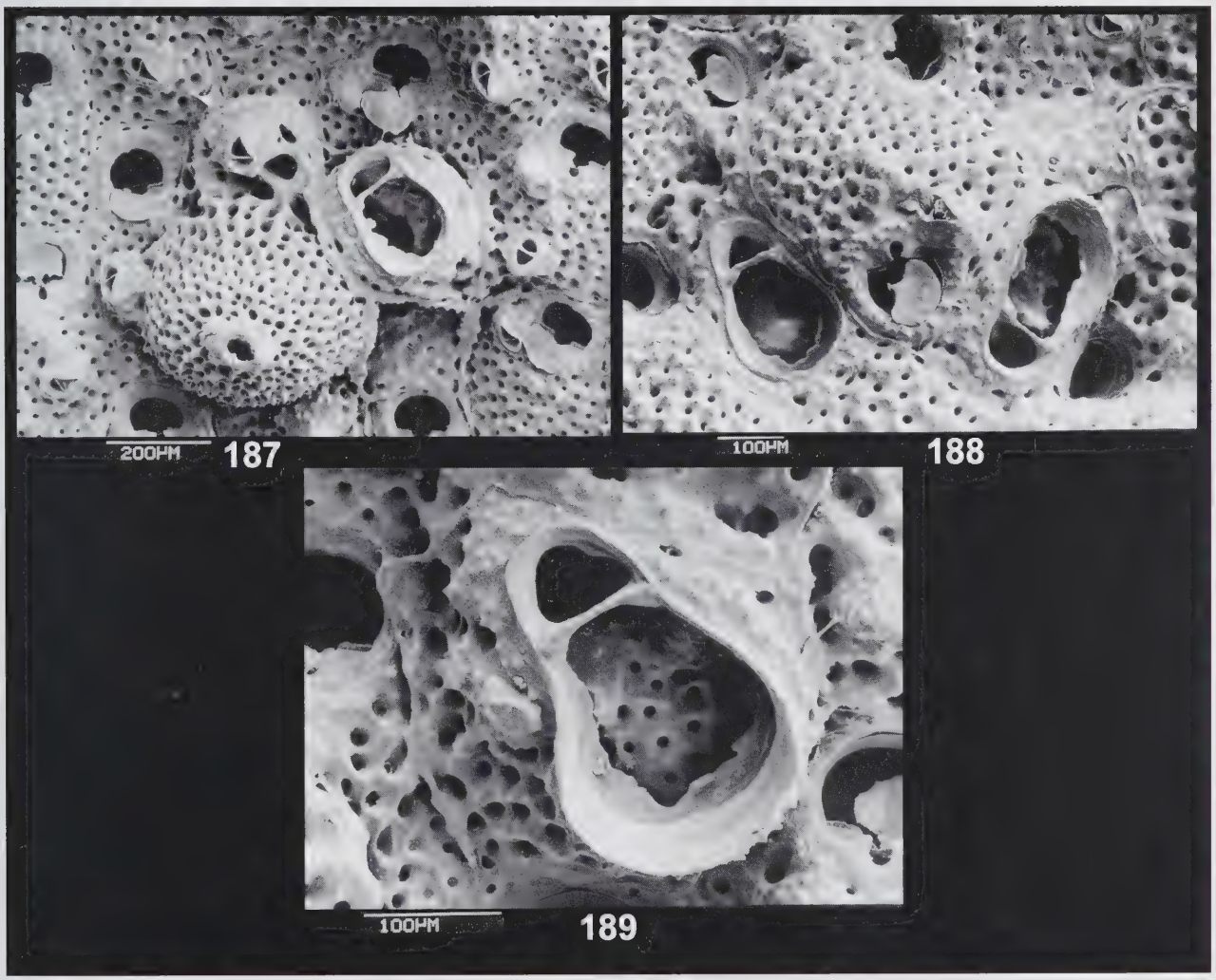
Material Examined: MCZ Smitt no. 127. *Hippothoa spongites*. January 16, 1869. Cast no.. 5, W of Tortugas, 36 fms.

Description: Colony encrusting to tubular, uni-to multilaminar. Zooids are rectangular, forming a regular brick-like pattern in the primary layer (Fig.190), becoming more irregularly polygonal in frontally budded layers. The frontal surface is covered by pustulose calcification, which, except in the vicinity of the orifice, is penetrated by many small pores. A short, central, suboral tubercle is sometimes visible in young zooids, as are marginal areolae (Fig. 190). A distinct raised thread of calcification marks lateral edges of zooids. The orifice is located at the distal end of the zooid, often off-center and slightly tilted relative to the distal wall. It is slightly more than semicircular anteriorly. Beaded bar-shaped condyles stretch along the proximal edge of the anterior portion almost to the central opening of the teardrop-shaped sinus notch. Distolaterally-directed adventitious avicularia with a rounded base and a narrow triangular mandible are found singly or in pairs below and to one side of the orifice, their rostra are raised diagonally upward (Fig. 192). Similar avicularia may occur on the proximal portions of zooids, directed proximo-laterally, as well as on ovicells (Figs. 191, 193). The ovicell is very large (1 ½ - 2 times width of autozooids in diameter), globular, and covered by the same pustulose, porous calcification as autozooids. Vicarious avicularia with broadly spatulate mandibles may also occur (Figs. 194, 195).

Discussion: Specific determination of these specimens of *Stylopoma* was made possible thanks to Alan Cheetham and JoAnn Sanner of NMNH. The specimen from MCZ Smitt #127 was analyzed according to the methods used

by Cheetham & Jackson in their *Stylopoma* studies. This colony fell into the *S. projecta* group. It is characterized by the small narrowly-pointed frontal avicularia, the presence of proximally directed avicularia, and avicularia-studded ovicells, and well as the centrally located frontal umbo and bar-shaped condyle.

Stylopoma projecta	LZ	WZ	Lo	Wo	Wav	Wav	Lov	Wov
N	6	6	6	6			6	6
MEAN mm	0.56	0.29	0.08	0.10			0.48	0.5
ST DEV mm	0.01	0.01	ERR	0.01			0.05	0.02
RANGE min	0.55	0.29	0.08	0.10			0.414	0.468
max	0.57	0.30	0.08	0.11			0.54	0.54



Figures 187-189. *Stylopoma minuta*. Smitt MCZ # 54. Fig. 187. Group of zooids, showing an ovicells with an avicularium, and large spatulate avicularium. Fig. 188. Group of zooids, showing orifice shape and large spatulate avicularia. Fig. 189. Close-up of avicularium.

Stylopoma smitti, new species
Figs.196-199 (Smitt MCZ #155)

Hippothoa spongites Smitt, 1873: 42 (in part).
Hippothoa or *Schizoporella spongites* Verrill, 1900: 592. ???
Schizoporella spongites Osburn, 1914: 207 (at least in part).
Stylopoma spongites Long & Rucker, 1970: 19, fig. 3:6; Winston, 1982: 146, fig. 78.

Holotype: MCZ Smitt no. 155. Bryozoa [including *Stylopoma spongites*] Inside Floridan reef, 4 faths. L. F P.[ourtales]. [n. d.].

Other Material Examined: Paratype: VMNH. No.2796.00 *Stylopoma Smitti.* Amber sands beach access, S. of Sebastian Inlet, Indian River County, FL. J. E. Winston, 01 August 2002. VMNH. No. 2941.00 Avalon beach, N. Hutchinson Island, St. Lucie Co., FL. J. E. Winston, 15 July 2002.

Etymology: Named after Fredrik Adam Smitt.

Diagnosis: Stylopoma having orifice with broad tab-shaped condyles and narrowly teardrop shaped sinus, evenly spaced medium-sized frontal pores, smaller pores on ovicells, and occasional large spatulate avicularia.

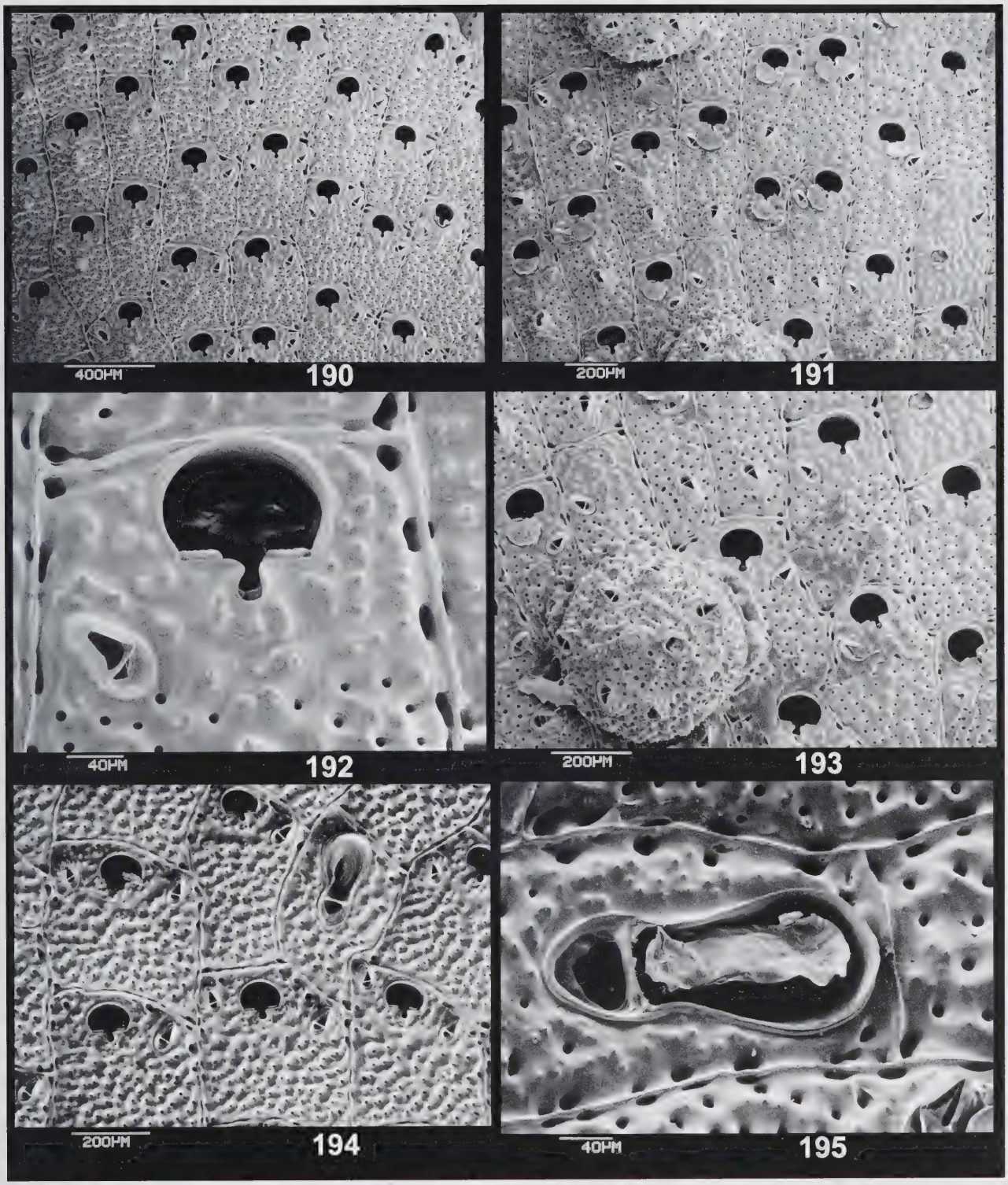
Description: Colony encrusting, becoming multilaminar, usually peach colored, but living colonies ranging from almost white to orange. Zooids of initial layer of colony rounded quadrangular (Fig. 197), those of frontally budded layers more irregularly polygonal. Frontal wall heavily calcified, with a granular texture, and evenly covered by numerous medium sized pores which give living colonies a characteristic polka-dotted appearance (Fig. 196). Orifice located just below the distal rim, often offset closer to one edge than to the center. Anterior part of orifice is more than semi-circular, posterior part with a deeply slit, round-bottomed, almost tear-drop shaped sinus, with broad condyles extending almost to the sinus and with thickened denticles or "tabs" at the inner edges (Fig. 199). There is often a granular-textured umbo in the frontal wall just below the sinus. Small cross-barred avicularia, rounded proximally and with an equilaterally triangular mandible, may be found on the frontal wall, at or below the level of the sinus and directed distolaterally. Occasional large spatulate interzooidal avicularia may also occur. None were present in the one MCZ specimen. Ovicells are distinctive, spherical, large in comparison with zooids, covering part of the frontal surface of several zooids. They have a rough textured surface covered with smaller and more closely spaced pores than those of zooid frontal walls (Fig. 198).

Discussion: Smitt used the name "*spongites*" for all his *Stylopoma* material. He does not seem to have illustrated or discussed this specimen which, along with *Bracebridgia subsulcata* and *Schizoporella pungens*, occured in a Smitt MCZ sample identified only as "Bryozoa". Although no depth was given, the determination of the locality as "behind the Floridan reef" indicates that it was from shallower water than most of the samples that Pourtalès collected in the 1868-69 surveys. This species is the common shallow water *Stylopoma* in southern Florida, found in intertidal and subtidal collections from the Indian River region of the east coast of Florida, south to Miami, the Florida keys, and along the Gulf coast at least as far as Sarasota. Most references to *Stylopoma spongites* or *informata* in Florida probably are to this species. However, since Jackson & Cheetham have shown the existence of more than a dozen undescribed species of *Stylopoma* in the Caribbean region, all records must be considered suspect until verified by examination of specimens.

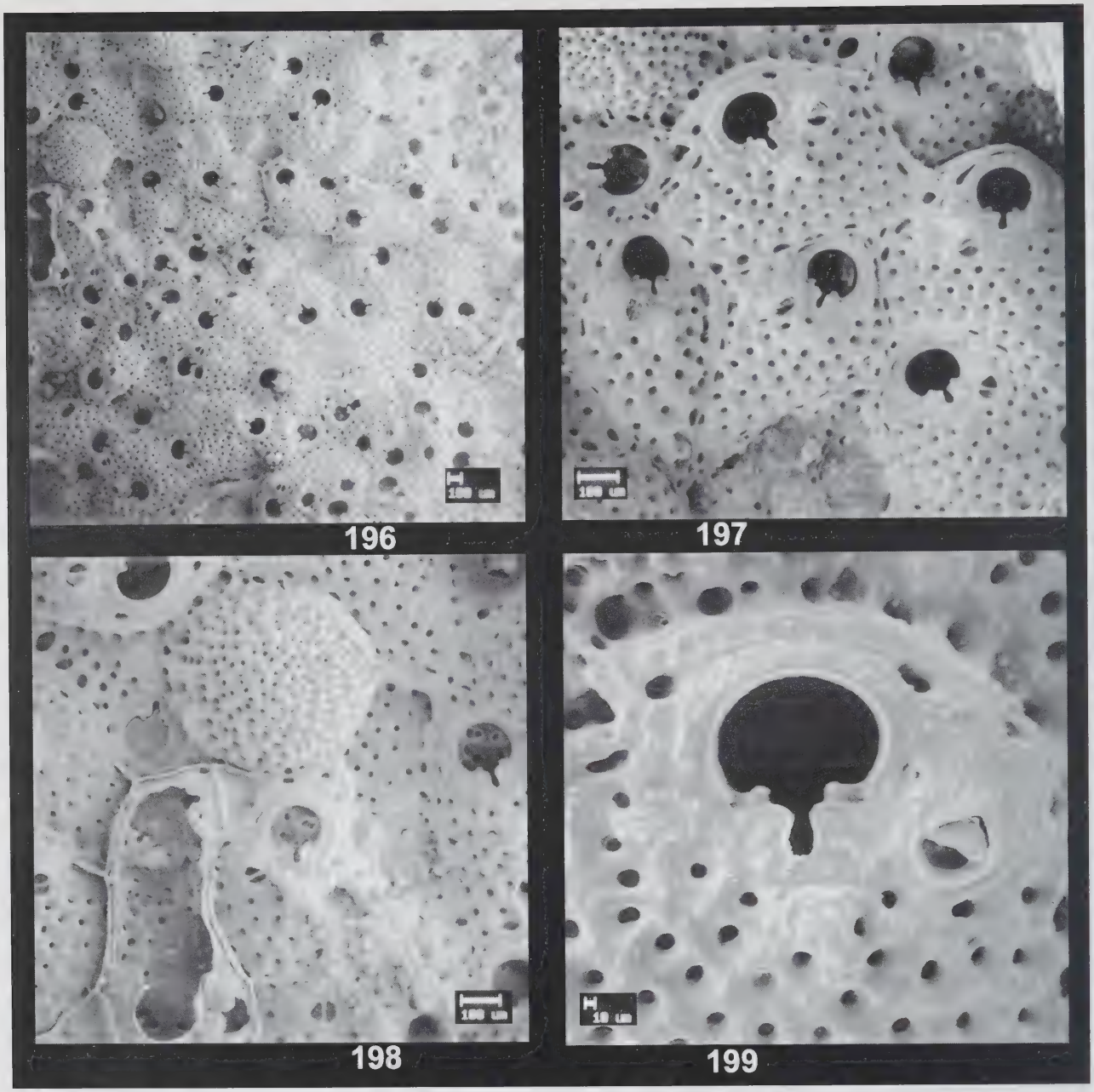
Eschara spongites was described by Pallas (1766), who in his description and illustrations had combined two very different species, *Calpensia nobilis* and *Stylopoma spongites*, both of them Mediterranean species capable of forming tubular encrustations around the seagrass, *Posidonia*. This confusion was straightened out by Harmer (1930), who made the figure of Gualtieri (1742), reproduced by Pallas (166) the type. Thomas & Hastings (1967) designated a neotype. The known occurrence of at least 15 *Stylopoma* species in the region, as well as the fact that current day knowledge of the specific significance of morphological variation in bryozoans was based on rearing experiments in this genus (Jackson & Cheetham, 1990, 1994; Cheetham et al. 1993, 1994), attest that specific identity of Florida Atlantic and Adriatic Mediterranean material is unlikely. Therefore this common shallow water Florida species is described and named as distinct. It differs from the other two *Stylopoma* species found in the Smitt material by virtue of its tab-, rather than bar-shaped condyles, and the fact that its ovicell porosity differs from from that of autozooid frontal walls. In addition, unlike *S. projecta*, the ovicell is not covered with avicularia.

Distribution: Florida, Gulf of Mexico, Caribbean.

Stylopoma smitti	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.57	0.49	0.13	0.12	0.06	0.04
ST DEV mm	0.04	0.04	0.01	0.01	0.01	0.01
RANGE min	0.522	0.432	0.108	0.108	0.054	0.036
max	0.63	0.54	0.144	0.135	0.072	0.054



Figures 190-195. *Stylopoma projecta*. Smitt MCZ # 127. Fig. 190. Group of autozooids. Fig. 191. Another group of zooids, showing part of an ovicell at upper left.. Fig. 192. Close-up of orifice and frontal avicularium, note beaded bar-shaped condyles of orifice. Fig. 193. Ovicell and neighboring zooids. Fig. 194. Zooids and spatulate interzoecial avicularium. Fig. 195. Close-up of spatulate avicularium.



Figures 196-199. *Stylopoma smitti*. Smitt MCZ # 155. Fig. 196. Group of zooids at low magnification, showing one ovicell. Fig. 197. Group of zooids. Fig. 198. Ovicell. Fig. 199. Close-up of orifice, note tabbed condyles and narrowly teardrop shaped sinus.

Family Hippaliosinidae, new family

Diagnosis: Colonies encrusting. Zooids with frontal wall imperforate except for a row [or rows] of marginal areolae. Orifice horseshoe-shaped distally, arcuate proximally, with triangular condyles. Ovicell endozooidal, orifices of fertile zooids larger and wider than those of autozooids. Aventitious avicularia single or paired, adjacent to orifice.

Type genus: Hippaliosina Canu, 1918.

Discussion: As defined by its genotype, Smitt's species *H. rostrigera,* Canu's genus *Hippaliosina* (Canu 1918) does seem to describe a small clade of Recent and fossil species, characterized by orifice shape, frontal wall morphology, and by the occurrence of female zooids with orifices differing in shape and size from those of autozooids. Since family relationships of the genus have never been clear, it is here given its own family.

Genus *Hippaliosina* Canu, 1918

Revised diagnosis: Colonies encrusting. Zooids with frontal wall imperforate except for row of marginal areolae. Orifice horseshoe-shaped distally, arcuate proximally, with triangular condyles. Ovicell endozooidal, orifices of fertile zooids larger and wider than those of autozooids. Aventitious avicularia single or paired, adjacent to orifice.

Type species: Escharella rostrigera Smitt, 1873.

Discussion: Canu & Bassler (1923, pp. 165-166) included six species in the genus. Some of them, including fossil Miocene-Pliocene specimens from the southeastern U.S. coastal plain, an undescribed species found in the Panama Paleontology Project, and the Reuss species, *Hippaliosina sandbergeri,* appear related to *H. rostrigera*, as do Recent specimens from the eastern Pacific and Galapagos called *H. rostrigera* by Osburn (1952), and *H. acutirostris* (Canu & Bassler, 1929) from the Philippines. Others, such as *Hippaliosina triforma* (Canu & Bassler 1929), and Osburn's *H. inarmata* and *H. costifera* (Osburn 1952), do not appear to belong to the group.

Hippaliosina rostrigera (Smitt), 1873
Figs. 200-206 (Smitt MCZ #126?, #154, 173)

Escharella rostrigera Smitt, 1873: 57, pl. X, figs. 203-205.
Lepralia rostrigera Osburn, 1914: 211.
Hippaliosina rostrigera Canu, 1918: 89; Canu & Bassler, 1923: 167, pl. 17, figs. 15-17; 1928b: 130, text-fig. 27; Hastings, 1930: 729; Osburn, 1940: 448; 1952: 475, pl. 56, fig. 9; Soule, 1961: 47; Cheetham & Sandberg, 1964: 1044, text-fig. 56; Shier, 1964: 641; Rucker 1967: 831, fig. 16e; Long & Rucker, 1970: 20, fig. 5:3; Winston, 1982: 139, fig. 65.

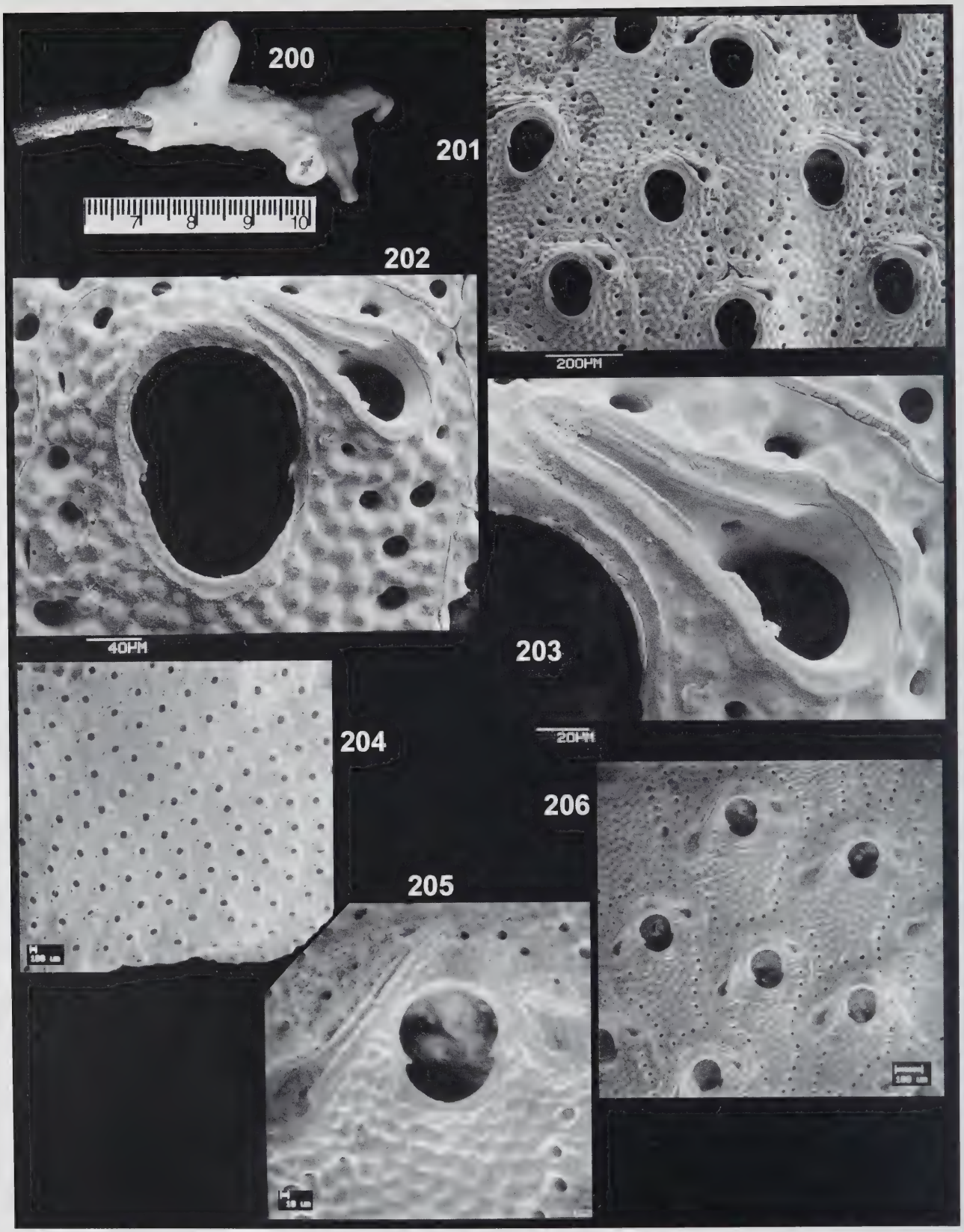
Material Examined: Syntypes. Smitt MCZ no. 126. *Escharella depressa rostrigera.* Jan. 16, 1869, Cast No. 11, W. of Tortugas, 43 fms. Pourt. Smitt MCZ no. 154. *Escharella depressa rostrigera.* Florida, Pourtales. Smitt MCZ no. 173. *Escharella depressa, rostrigera.* Florida, Pourt. Other material. USNM. *Hippaliosina rostrigera.* Pliocene. Caloosahatchie, Shell Creek, Desoto County, Florida. *Hippaliosina rostrigera.* Miocene. Duplin Marl, Natural Well, a. m., sw. of Magnolia. VMNH. no. 2623.00 *Hippaliosina rostrigera.* Juno Ledge site, off Palm Beach, Florida, M. & D. Littler 18 July 1999. VMNH no. 2585.00 *Hippaliosina rostrigera* Spanish Anchor site, off Palm Beach, Florida, M. & D. Littler 15 July 1999.

Description: Colonies encrusting, bright orange in life. Zooids rhombic, subrectangular to polygonal, quite variable in shape. Frontal wall of mature zooids relatively flat, consisting of imperforate and heavily beaded calcification except for a row of marginal pores, a distinct threadlike line marking the junction between zooids. Orifice horseshoe-shaped distally, deeply arcuate proximally, surrounded by a narrow flat rim which is slightly raised distally. Avicularia single or paired, with a rounded base and long, pointed mandible, directed obliquely inward from edge of zooid toward distal margin of orifice. Ovicell endozooidal. Fertile zooids distinguished by their larger size and wider orifices.

Discussion: Canu & Bassler (1923: pl.17, figs. 15-17) illustrate Miocene (Virginia) and Pliocene (Coloosahatchee Marl, Monroe County, Florida) material that they considered to belong to this species. Their Fig. 15 shows specimens with single avicularia and more porous frontal wall, Fig. 16, is viewed from underside, but Fig. 17 is very similar to Recent specimens from Florida. The USNM specimens examined also were very similar to Recent Florida material, the material from Caloosahatchie looking very little altered from life condition. The E. Pacific specimens given the name of *rostrigera* may belong to the Southeast-Gulf coast species, but only Osburn's 1952 Pacific monograph gives an illustration of material (his pl. 56, fig. 9), and it is ambiguous–the orifice is similar, but avicularia appear shorter.

Distribution: Cape Hatteras to Florida, Gulf of Mexico, Caribbean. Also reported from Galapagos, Panama, and Gulf of California.

Hippaliosina rostrigera	Lz	Wz	Lo	Wo	Lgz	Wgz	Lav	Wav	Lgz operc	Wgz operc
N	18	18	18	18	6	6	18	18	6	6
MEAN mm	0.58	0.33	0.15	0.11	0.52	0.44	0.13	0.04	0.14	0.16
ST DEV mm	0.06	0.05	0.02	0.01	0.02	0.05	0.07	0	ERR	0
RANGE min	0.486	0.27	0.117	0.09	0.504	0.378	0.07	0.036	0.144	0.162
max	0.66	0.414	0.18	0.12	0.558	0.522	0.306	0.045	0.144	0.171



Figures 200-206. *Hippaliosina rostrigera*. Fig. 200. Life-sized colony fragment growing around Smitt MCZ # 126 or 154?. Fig. 201. Group of zooids. Fig. 202. Close-up of orifice and avicularia. Fig. 203. Close-up of one avicularium. All Smitt MCZ #154. Fig. 204. Portion of small encrusting colony Fig. 205. Close-up of orifice and avicularia. Fig. 206. Group of zooids. All Smitt MCZ # 173.

Family Incertae Sedis

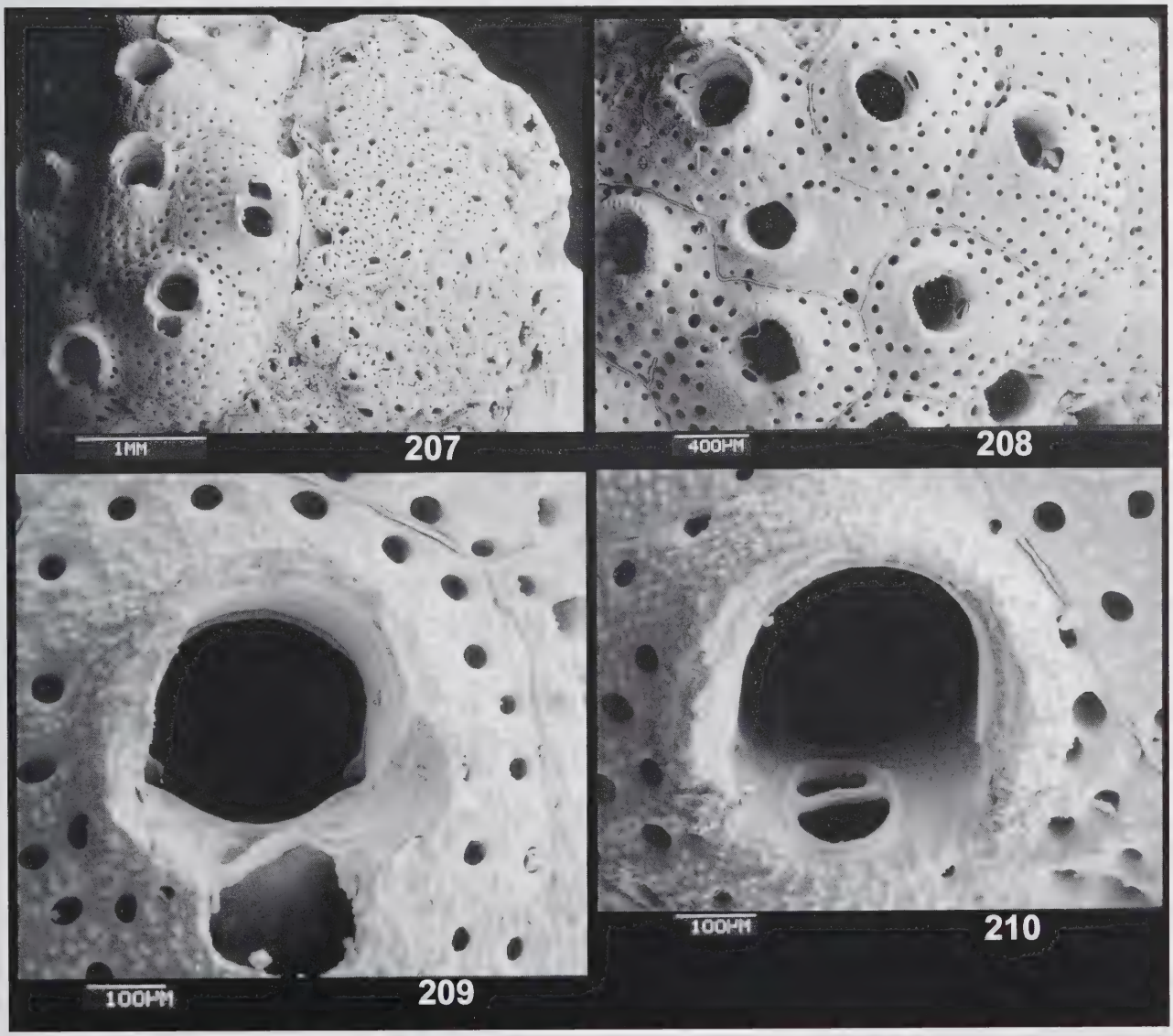
Genus *Gemelliporidra* Canu & Bassler, 1927

Gemelliporidra pertusa (Smitt), 1873
Figs. 207-210 (Smitt MCZ # 176)

Discopora pertusa Smitt, 1873: 72, pl. IX, figs. 182; pl. XII, figs. 240-241.
Trematoecia pertusa Osburn, 1947: 45 (possibly).

Material Examined: Syntype. Smitt MCZ no. 176. *Escharipora stellata*. *Discopora pertusa*. Jan. 16, 1869. Cast No. 12. W. of Tortugas 42 fms. Pourt.

Description: Colony forming small encrusting mounds, which are strikingly bumpy and coarsely textured in appearance due to the projecting peristomes of the extremely large convex zooids (Fig. 207). Zooids erect and convex with a thick round to polygonal peristome surrounding the primary orifice. The frontal wall is covered by a rough granular calcification, perforated except in the vicinity of the peristome, by numerous large round pores. Primary orifice bell-shaped, horseshoe shaped distally, with large rounded downward-projecting condyles, and a very shallowly arcuate proximal sinus, with an outer boundary wider than the greatest width of the anterior portion of the orifice (Fig. 209). An oval avicularium is found on the proximal wall of the peristome above the orifice, its mandible perpendicular to the operculum and directed obliquely outward (Fig. 210). No ovicells were present in the Smitt Floridan specimens.



Figures. 207-210. *Gemelliporidra pertusa*. Smitt MCZ # 176. Fig. 207. Encrusting colony of *Gemelliporidra pertusa* on left, showing extremely large zooids, compared with those of adjacent colony. Fig. 208. Group of zooids. Fig. 209. Close-up of bell-shaped orifice. Fig. 210. Another orifice showing position and shape of avicularia.

Discussion: This is a distinctive species. Zooids are so large that the colony resembles a colony of a small-polyped coral, as Smitt noted in his description. The only other species with which it could be confused is *Celleporaria magnifica*, which has zooids almost as large, but which differs in orifice shape (*C. magnifica* has a semi-circular orifice), the position of the avicularia (in *C. magnifica* the peristomial avicularia are directed laterally), and in possessing large interzooidal avicularia.

Osburn reported Smitt's *D. pertusa* from off Galera Point Light, Colombia, but as he did not illustrate his specimen, it is hard to be certain of its relationship to the Floridan material — the orifice description sounds very similar, but he describes small rounded avicularia on the frontal wall which do not occur in the one *Gemelliporidra pertusa* specimen present in the MCZ collection. Osburn placed the species in *Trematooecia*, although his description of the ovicell (1947: 46) as complete (rather than cap-like, or with a single large or row of pores), very large, opening into the peristome (not closed by the operculum) and covered with a porous calcification similar to that of the zooid frontal wall, differs from the other *Trematooecia* species he described. He recognized this, but thought the reason might be the heavily calcification of the specimen. In my view the species more closely fits another Caribbean genus, the genus *Gemelliporidra* (e.g., *Gemelliporidra typica*, *G. multilamellosa*, and *G. belikina*), in terms of calcification, large size, general zooid morphology, and mound-like growth habit. Those species also have very large round porous ovicells which open into the peristome.

Gemelliporidra pertusa	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	5	5
MEAN mm	1.22	1.03	0.25	0.28	0.16	0.12
ST DEV mm	0.17	0.16	0.01	0.02	0.02	0.01
RANGE min	1.026	0.756	0.234	0.252	0.144	0.108
max	1.422	1.224	0.27	0.306	0.18	0.126

Family Microporellidae Hincks, 1880

Genus *Microporella* Hincks, 1877

Microporella protea new species
Figs. 211-213, 215, 217-223 (Smitt MCZ # 151, #24)

Porellina ciliata Smitt, 1873: 26, pl. VI, figs. 128-129. [not figs. 126, 127]. NOT *Eschara ciliata* Pallas, 1766: 38 .

?*Microporella ciliata personata* Osburn, 1947: 36. NOT *Microporella personata* Busk, 1854: 74, pl. XC, figs. 24.

Microporella ciliata Long & Rucker, 1970: 20, fig. 4:3.

Holotype: Smitt MCZ no. 151. *Porellina ciliata, Escharella biaperta*? [no date]. Off Cape Fear, Bald Head Light NNE 14 mi, 9 fms. Pourt. 1869.

Other materials: Smitt MCZ no. 24. *Porellina ciliata, Hippothoa biaperta.* Jan 27, 1868, 1 1/4 mi. S. of Sand Key, 10 fms. Pourt. Smitt MCZ no. 53. *Porina ciliata, Escharella biaperta.* Jan 27, 1868. 1 1/4 miles S. of Sand Key, 10 fms. Pourt.

Etymology: protea — because of the transformation in its morphology with increasing calcification and ovicell development. From Proteus, a sea god capable of changing his form.

Diagnosis: Microporella with 3-4 jointed spines, a semi-circular orifice with a beaded proximal rim and no condyles, a crescentic ascopore, a single well-proximal, laterally directed, triangular avicularium, and an ovicell with pustulose calcification and development of projecting arms or bridge across the orifice.

Description: The colony is encrusting, unilaminar to multilaminar. Zooids are irregularly rhomboidal in shape, about as wide as they are long, frontal surfaces granular, penetrated by numerous (about 30 to 45) irregularly-shaped pores of various sizes. Zooids are separated by shallow grooves that become less distinct with increasing calcification. The line marking the junction of the intercalary cuticles of adjacent zooids is wavy or scalloped (Fig.218). Secondary calcification results in thickening and increasing irregularity of the frontal wall, the pores becoming deeply sunken or obscured. The orifice is semi-circular, with a beaded proximal rim and no condyles (Fig.215). Most zooids have 4 hollow jointed oral spines, but a few have only 3. The crescentic, denticulate ascopore is located just below the orifice, surrounded by a slightly raised collar. A single large, very broad avicularium with a complete crossbar and a triangular mandible is located well-proximal to, and on one side of, the ascopore, at about the level of the midpoint of zooid length and directed laterally. Ovicells (Figs. 220, 221) are globose and covered with the same thick granular to pustulose calcification as zooids, and show some poorly developed ribs. Fertile zooids develop a peristome which curves around into two projecting arms which may or may not coalesce into a proximal bridge dividing the secondary orifice in two.

Discussion: SEM study in recent years has led bryozoan systematists to describe a number of new *Microporella* species on the basis of readily discernible differences in the following characters: number and nature of oral spines, shape of orifice, presence of condyles, nature of proximal edge of orifice (smooth, serrated, beaded, etc.), morphology and position of ascopore, size, shape and position of avicularia, calcification of frontal wall, and nature of ovicell. Smitt called all his *Microporella* specimens *Porellina ciliata*, a name long used for *Microporella* species with single, rather than paired avicularia, but the species in the MCZ collection is not *M. ciliata*. Smitt's figures 126 and 127 appear to belong to a species with single rather than paired avicularia, positioned closer to the distal end of the zooids, and with a non-personate ovicell. No material of this species, which may either be the common inshore species found in Florida (called *Microporella umbracula* in Winston 1982), or some yet undescribed species, occurs in the Smitt MCZ collection. The species illustrated in Smitt's figures 128 and 129 is the only one found in the Smitt MCZ material. It is a personate species, one in which a peristomial bridge surrounds the base of the ovicells. *Microporella ciliata* is a British species. Figures 214 and 216 illustrates a specimen of *Microporella ciliata* from Plymouth Sound for comparison with *M. protea*. *Microporella ciliata* has 5-6 oral spines, and an orifice which is neither proximally beaded nor serrated, but does have two distinct condyles at the outer proximal edges. According to Hayward & Ryland (1999: 296) it may develop a personate ovicell, but usually has a non-personate ovicell.

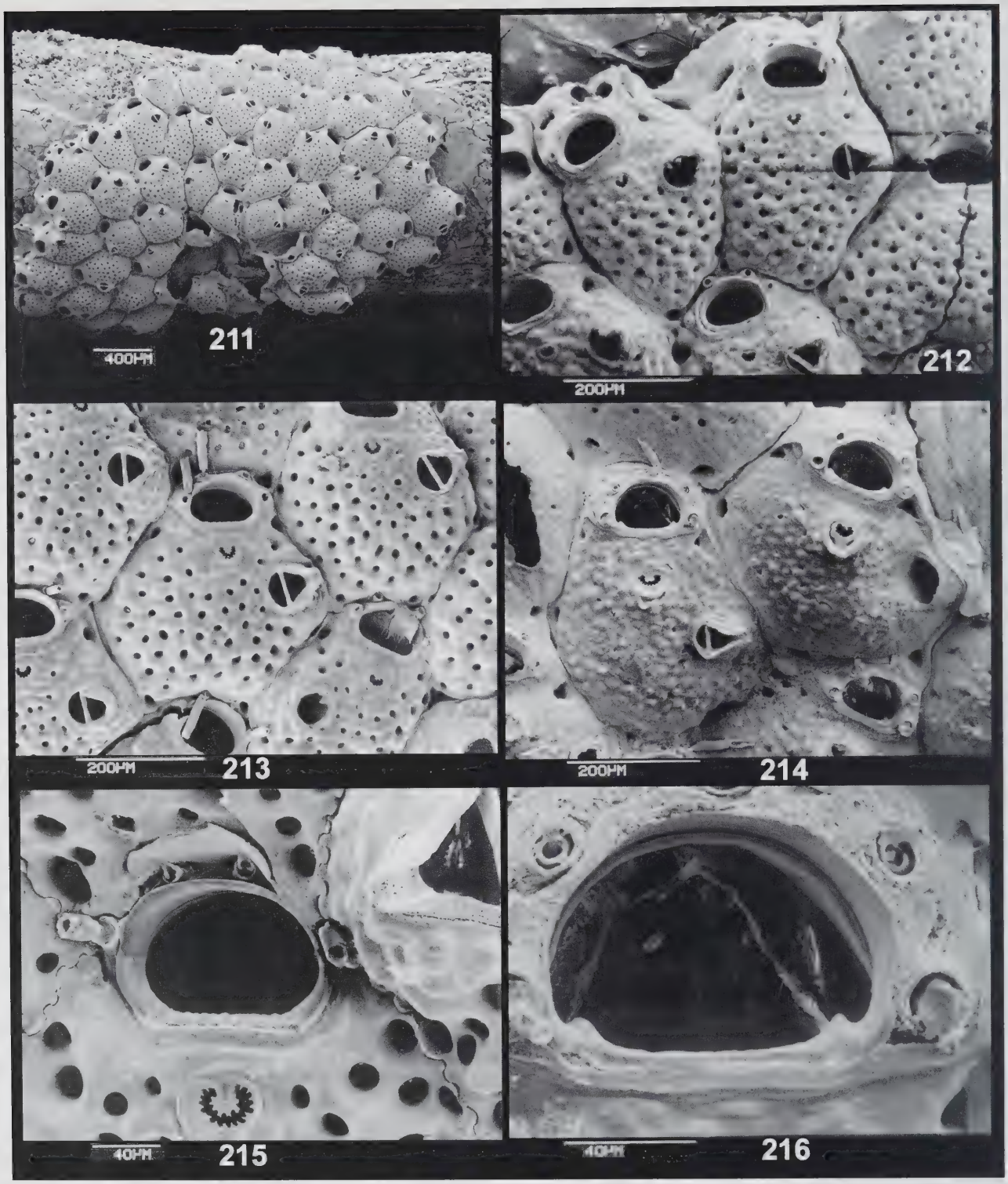
The material in the Smitt MCZ collection is most similar to *Microporella pontifica*, a species described by Osburn (1952) from the Gulf of California. But the Atlantic material shows some differences from that species also. In comparison with *protea* the specimen of *pontifica* illustrated by Osburn (1952: pl. 44, fig. 5) has 4-6 oral spines, avicularia which are smaller relative to zooid size and positioned closer to zooid centers, and have lanceolate mandibles; the ovicell is also smaller relative to zooid size, with a few scattered pores, but without a trace of ribs; the peristomial bridge forms an open circle around the ascopore, rather than just crossing above it, so there are really 2 peristomes, one for primary orifice and one for the ascopore. *M.pontifica* also appears to be larger in size (lz .5-.6mm, wz, .4-.45mm, lo .08, wo .10 mm, wov avg. .26mm)

Of the two colonies from the Smitt MCZ collection illustrated, Smitt MCZ #24, is a very young colony, forming a single layer, and with no ovicells. Although the ancestrula is broken, the early growth pattern can be seen. It has four spines, a deeply crescentic ascopore, and semicircular orifice with a beaded proximal edge and no condyles. The single avicularium is large relative to zooid size, aimed laterally to slightly distolaterally and located just below the mid-point of the zooid, well below the ascopore. The mature colony of Smitt MCZ #151, from off the Carolina coast, has similar autozooid morphology, although heavier secondary calcification, and it has ovicells with granular porous calcification, that show faint radiating ridges also (Figs. 220, 221). A bridge of calcification extends from their base, partly or completely obscuring the ascopore.

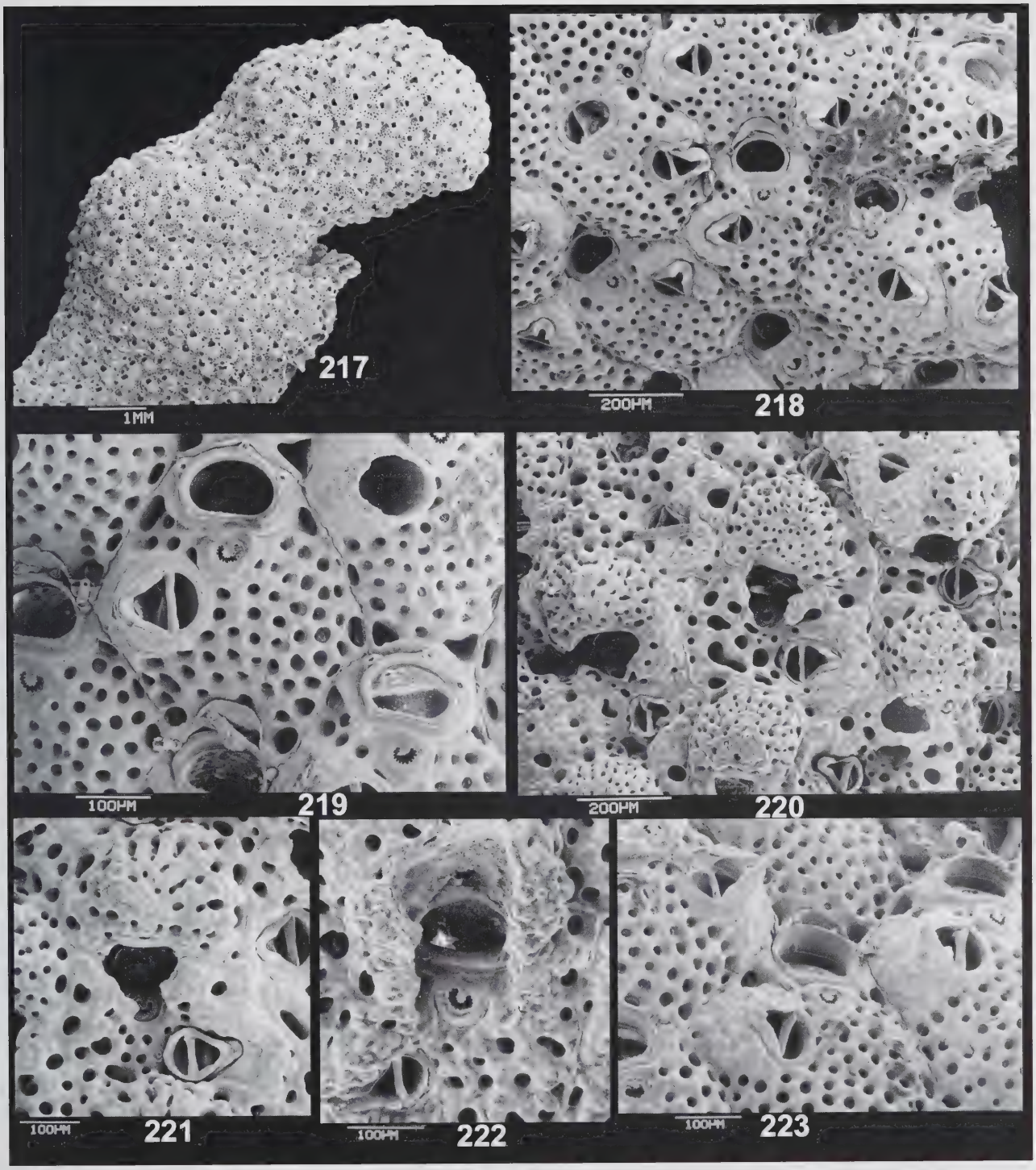
Because of past confusion of this species with *M. ciliata* and other *Microporella* a complete synonymy is not possible. The specimen illustrated by Long & Rucker (1970) almost surely belongs to this species, and it seems likely that the species that Osburn (1947) called *M. ciliata personata* may be Smitt's species. However, the specimens from the mudlump fauna (Cheetham & Sandberg 1964: 1035, text-figs. 40, 41) have more oral spines, and seem closer to the E. Pacific *M. pontifica*.

Distribution: Cape Hatteras to Florida. Caribbean?

Microporella protea	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav	Lorf_asc
N	24	24	24	24	6	6	15	15	16
MEAN mm	0.44	0.36	0.07	0.11	0.19	0.25	0.1	0.08	0.04
ST DEV mm	0.05	0.06	0.01	0.01	0.01	0.02	0.02	0.02	0.01
RANGE min	0.36	0.27	0.054	0.09	0.18	0.216	0.072	0.054	0.018
max	0.54	0.54	0.09	0.126	0.198	0.27	0.126	0.126	0.045



Figures 211-213, 215 *Microporella protea* new species . Southeast coast of U.S. Figs. 214, 216. *Microporella ciliata.* Plymouth Sound, England. For comparison with M. *protea.* Fig. 211. *Microporella protea.* Young colony from Smitt MCZ #24. Fig. 212. Group of zooids at growing edge. Smitt MCZ # 24. Fig. 213. Another group of zoiods from same colony , showing oral spines. Fig. 215. Close-up of orifice area, showing shape of orifice, spines, and ascopore. Smitt MCZ # 151. Fig. 214. British colony of *Microporella ciliata*, showing shape of orifice, oral spines, shape and position of ascopore and shape and position of avicularia. Fig. 216. *Microporella ciliata*, shape of orifice in comparison with that of Smitt's Floridan *Microporella* (Fig. 214). All AMNH no. .



Figures 217-223. *Microporella protea*. Smitt MCZ # 151. Fig. 217. Portion of large, sexually mature colony. Fig. 218. Group of zooids. Fig. 219. Close up of zooids showing orifice shape, and size, position and morphology of ascopore and avicularia. Fig. 220. Ovicelled zooids. Figs 221. Close up of ovicelled zooid. Fig. 222. Close-up of ascopore surrounded by ovicell bridge calcification. Fig. 223. Angled view of frontal surface to show raised rostra of avicularia.

Family Petraliellidae Harmer, 1957

Genus *Petraliella* Canu & Bassler, 1927

Petraliella bisinuata (Smitt) 1873
Figs. 224-226 (Smitt MCZ #55)

Escharella bisinuata Smitt, 1873: 59, pl. XII, fig. 229.
Petralia bisinuata Osburn, 1914: 217.
Petraliella bisinuata Canu & Bassler, 1928b: 78, pl. 16, figs. 1-5; pl. 33, fig. 4, text-figs. 12a-h; Osburn, 1940: 410.

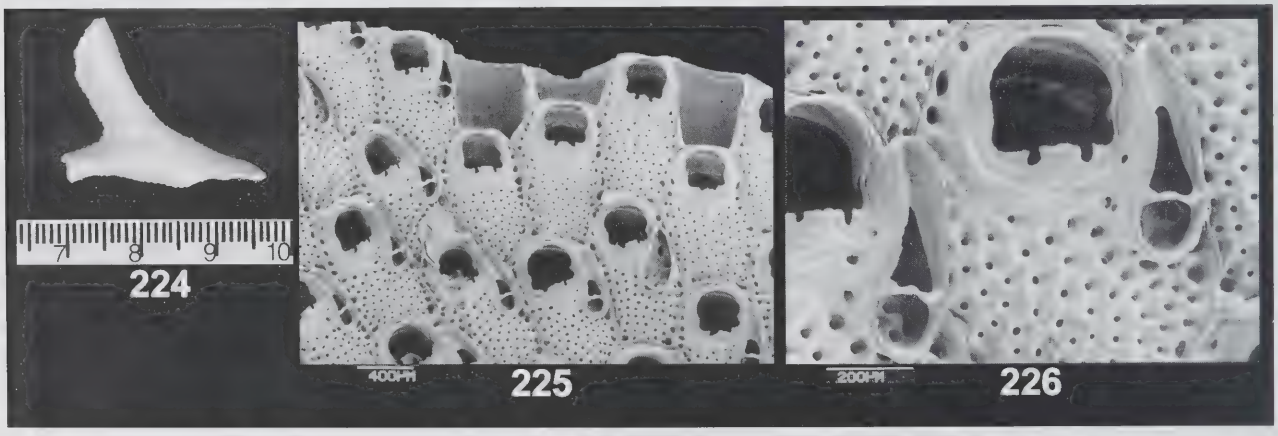
Material Examined: Syntype. Smitt MCZ no. 55. *Escharella bisinuata.* May 4, 1868. Cast No. 1 [off Bahia Honda], 19 fms. Pourt. VMNH no. 2631.00 *Petraliella bisinuata.* Juno Ledge Dive Site, off Palm Beach, Florida, colls. Barrett Brooks, Mark and Diane Littler, 100 ft, 15 July, 1999. VMNH no. 2594.00 *Petraliella bisinuata.* Spanish Anchor Dive Site, off Palm Beach, Florida, 26° 48.186 N, 80° 00.309W., colls. Barrett Brooks, Mark and Diane Littler, 140 ft, 18 July, 1999. NMNH. [no Cat. No.] *Petraliella* [no sp.]. Atlantic, 40 f., Fowey Light, 15 mi. S., Miami, Florida. Cat. No.10072. *Petraliella* [no sp.] Atlantic. Alb. Sta. 2612, E. of Wilmington, NC. Cat. No. 11171. *Petralia bisinuata* (Smitt), Gulf of Mexico, Alb. Sta. 2409. March 18, 1885, 26 fms. Alb. USFC. 27°04' N, 83°21'15" W. R. C. Osburn.

Description: Colony red in life, encrusting to erect in unilaminate, foliaceous ruffles. May be loosely attached to substratum via radicles stemming from pores on dorsal surface. Zooids large, subrectangular to polygonal, with a flat frontal wall covered with round, depressed pores and having a few larger marginal pores (Fig. 225). The orifice is large, horseshoe-shaped anteriorly, its proximal edge bisinuate, with a small u-shaped sinus on either side of a broad central lyrula (Fig. 226). Most zooids have a large curved, triangular avicularium, with a complete crossbar and strongly reinforced rostrum, extending from the midpoint of the zooid forward to the distal edge of the orifice. Some zooids lack avicularia; others have two, and in this case, one of them is usually larger than the other. Ovicells are large, hemispherical and covered with pores. The specimen illustrated (Smitt MCZ #55) has only one partly formed ovicell (Fig. 225).

Petraliella bisinuata	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	1.09	0.67	0.31	0.33	0.53	0.24
ST DEV mm	0.03	0.02	0.01	0.02	0.02	0.02
RANGE min	1.06	0.64	0.3	0.32	0.5	0.22
max	1.12	0.7	0.32	0.36	0.56	0.26

Discussion: Only one sample of this species occurred in the Smitt MCZ collection, from one of the two stations mentioned by Smitt (1873) in his description (p.59). Smitt's species has also been described by Harmer (1957) in the Siboga series. Harmer did have access to Gulf of Mexico material received from Canu & Bassler; however, it seems unlikely that his Indonesian specimens belong to this species. Specimens from the coast of Florida have been found in association with subtidal algae and on hard grounds in the Gulf of Mexico off Tampa.

Distribution: Cape Hatteras to Florida, Caribbean, Gulf of Mexico. Pliocene of Panama (Canu &Bassler 1928b).



Figures 224-226. *Petraliella bisinuata.* Smitt MCZ # 55. Fig. 224. Colony fragment, life size. Fig. 225. Group of zooids at growing edge; partly formed ovicell can be seen on one zooid. Fig. 226. Close-up of orifice and avicularia.

Family Incertae Sedis

Genus *Escharina* Milne-Edwards, 1836

Escharina porosa (Smitt) 1873
Figs. 227-230 (Smitt MCZ # 87)

Hippothoa porosa Smitt, 1873: 41, pl. VII, fig. 158.

Mastigophora porosa Canu & Bassler, 1928a: 95, pl. IX, fig. 10; 1928b: 134, pl. 19, figs. 8, 9, text-fig. 29; Osburn, 1940: 453; Osburn, 1952: 480, pl. 58, fig. 4.

Escharina porosa Cheetham & Sandberg, 1964: 1032, fig. 33; ? Banta & Carson, 1978: 399, fig. 4D; Winston, 1986: 19, fig. 39. [NOT *Escharina porosa* Verrill, see Maturo & Schopf, 1968: 48].

Material Examined: Smitt MCZ #87. *Porina plagiopora. Escharella pertusa* [= *Escharina porosa*]. Jan. 18, 1869. Cast No. 3, W. of Tortugas. Pourt.

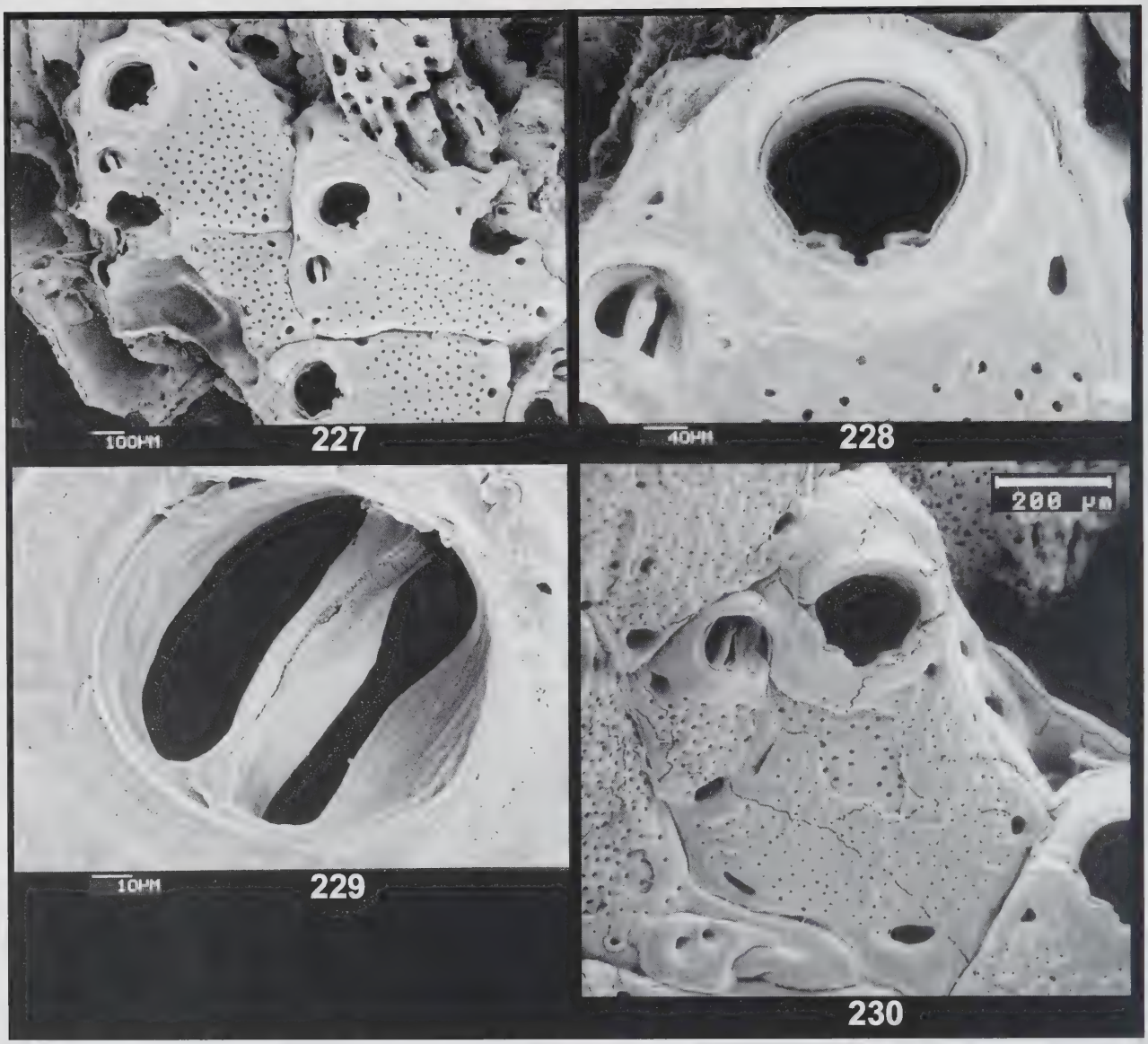
Description: Colony encrusting, unilaminar, multiserial, but often, small, and runner-like in growth form. Zooids irregularly polygonal, rounded distally, and sharp cornered proximally. Small pore chambers visible on outside lateral walls of colony (Fig. 227). Frontal wall, flat, with numerous small pores and a granular surface, as well as a few large marginal pores. Orifice slightly more than semi-circular distally, proximally, curving upward slightly on each side of the very small, U-shaped, central sinus, but with long low condyles extending almost to the sinus and giving the proximal edge a complex cut-out shape. The primary orifice surrounded by a broad, circular, radially ringed, peristome. Below the orifice and toward the outer edge of each zooid is an avicularium in somewhat swollen, small pored chamber, which may be set off from the zooid by areolae. Its opening is oval, with heavy skeletal thickening both on the pivotal crossbar (Fig. 229) which supports the large curved, setiform, transversely hinged mandible and reinforces the edges of the avicularian opening itself. Ovicell (none present on the MCZ Smitt specimen, so illustrated here by a specimen from the north coast of Jamaica) is small, recumbent, bonnet shaped with a flared rim, and imperforate (Fig. 230).

Discussion: This species seems to be associated with calcareous substrata, corals, shell, or crustose algae. The species was common in cryptic reef environments in Jamaica, but colonies always seemed to be small, heavily bored, and grazed, and very few had ovicells. Only one specimen was present in the Smitt MCZ collection. It is encrusing a calcareous nodule which is almost entirely covered by a colony of *Reptadeonella hastingsae.* At the very edge of the *Reptadenonella* are a few small remnants of the colonies of four other species, *Puellina, Microporella* and *Aimulosia*, as well as *Escharina porosa.* As Smitt may not have recognized that this specimen was his *Hippothoa porosa* (he called it "*Escharella pertusa*" on label of sample), this specimen may not be considered a syntype. Osburn (1952) lists this species from the Pacific coast of Colombia, the specimen he illustrated is very similar to the Caribbean material, as is the illustration in Banta & Carson (1978). Cook (1985: 165) records *Escharina porosa* from Ghana, also, but her SEMs (Pl. 16, figs. E and F) show a closely related, but not morphologically identical species, similar to one Hayward (1974) recorded from the Agean island of Chios. In Ghanaian zooids, the orifice is more circular, has a larger sinus, and condyles are not as apparent, frontal pores are more numerous and closely spaced, the avicularian chamber is more clearly set off from the zooid, and the outline of the avicularian opening is not oval, but subtriangular, with a reinforced lip (almost like a mini-peristome).

The family position of the genus (type species *Escharina vulgaris*) is still unclear. It has sometimes been placed in the Schizoporellidae (e.g., Hayward & Ryland 1999). Dennis Gordon's 2002 Interim Classification (http://www.civgeo.rmit.edu/au/famsys/html) leaves its placement questionable. This is not a simple problem, but one which will require require further morphological study especially of the ancestrula which is tatiform in *E. vulgaris*, non-tatiform in *Schizoporella* species (Ken McKinney, personal comm.), and of the ovicell which might have a partly membranous ectooecium, as in *Lacerna*, but whose ontogeny has not yet been studied (Peter Hayward, personal commun.).

Distribution: Florida, Caribbean, Gulf of Mexico, and possibly tropical eastern Pacific.

Escharina porosa	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	4	4
MEAN mm	0.71	0.51	0.12	0.14	0.1	0.08
ST DEV mm	0.11	0.09	0.01	0.02	0.01	0.01
RANGE min	0.576	0.414	0.108	0.117	0.09	0.072
max	0.864	0.648	0.144	0.18	0.108	0.09



Figures 227-230. *Escharina porosa.* Florida and Jamaica. Fig. 227. Group of zooids. Smitt MCZ # 87. Fig. 228.Close up of orifice. Smitt MCZ # 87. Fig. 229. Close-up of avicularium. Smitt MCZ # 87. Fig. 230. Ovicell of a Jamaican colony of *Escharina porosa.*

Family Lacernidae Jullien, 1888

Genus *Cribellopora* Gautier, 1957

Cribellopora constellata new species
Figs. 231-235 (Smitt MCZ #, 118, 128)

Hippothoa isabelleana Smitt, 1873: 44, IN PART, pl. VIII, fig. 168. NOT pl. VIII, figs. 166, 167 = *Schizoporella isabelleana*).

Holotype. Smitt MCZ # 118. [not identified, names on label are] *Cribrilina innominata*, *Escharipora stellata*, *Hippothoa porosa* (Hyndmann), *Hippothoa biaperta.* Jan 16, 1869, Cast No. 12, W.of Tortugas, 42 fm. Pourt. *Paratype.* Smitt MCZ # 128. *Hippothoa isabelleana.* Jan. 16, 1869, Cast NO. 12 W. of Tortugas, 42 fms. Pourt.

Etymology: From the Latin, constellatus = starry, for its star shaped pores..

Diagnosis: Cribellopora with denticulate pores evenly spread over the frontal surface, no oral spines, and with a relatively small, smooth surfaced ovicell.

Description: Colony encrusting. Zooids convex, broad, sub-hexagonal to polygonal, distal edges rounded. The frontal wall penetrated by numerous stellate pores, only faintly discernible in specimens with cuticle (Fig. 231), but showing clearly on skeletal specimens (Figs. 232-235). Their star shape is caused by 5-8 denticles which grow inward from the edge of the pore, and may fuse (e.g., lower right in Fig. 234). The pores are found all over the frontal wall except on the peristome, and in

the region right below the orifice, where they are sparse or lacking (Fig. 233). Orifice is semi-circular anteriorly, with heavily beaded condyles sloping to the shallow-U shaped proximal sinus. No oral spines on Smitt specimens. No aviciularia. Ovicell small relative to zooid size, rounded, recumbent (Fig. 231), imperforate, closed by the operculum.

Discussion: Smitt illustrated the species (Fig. 168), but apparently did not recognize it, believing it either to be a variety of *H. isabelleana* (=*Schizoporella pungens*), or as he stated in his figure legends, "part of a variety of this species [*H. isabelleana*], in a higher degree of calcification, growing in a single zooidal layer, doubtfully to separate from the *Hippothoa secundaria* of the northern regions." Lagaaij (1963: 187, pl. IV, figs. 7, 8) recorded *Cribellopora trichotoma* from the northwestern Gulf of Mexico, and made the connection of his material and Smitt's material with the species originally described by Waters (1918: 19, pl. 2, figs. 1-4). *Cribellopora trichotoma* has been recorded from the Mediterranean (Gautier 1962), Cape Verde Islands (Waters), Ghana (Cook 1985), and the eastern Pacific (Osburn 1952; Soule 1961).

However, there are some differences between European material and Smitt's material, and between Smitt's material and Lagaaij's Gulf of Mexico material that suggest a species complex, rather than a single widespread species, is involved. Proportions of zooids and ovicells are different in Smitt's material. Zooids are wider relative to length than Mediterranean specimens as measured by Gautier, or the Ghanaian material of Cook, and the ovicell shorter relative to its width and smaller relative to zooid size. There are no ovicell median ridges, mucrones or tuberosities (as described by Waters for *C. trichotoma* and by Gautier (1957) for *C. simplex*. Waters described four oral spines on his material, and Cook described material with 6 oral spines. No oral spines (or spine base scars) could be detected on the Smitt MCZ colonies. On the Smitt material the stellate pores cover the entire frontal surface evenly and fairly densely, except right around the peristome. European material seems to have fewer pores on the center of the frontal surface. Gulf of Mexico material appears to have sparser pores, than European material (although it may be like *constellata* in lacking spines, as they are not mentioned by Lagaaij, or shown on his illustration). The structure of the pores in the other species is not described as denticulate, as in *constellata*, but this may just be because the other species were not studied via SEM.

Distribution: Florida.

Cribellopora constellata	Lz	Wz	Lo	Wo	Lov	Wov
N	18	18	18	18	2	2
MEAN mm	0.63	0.52	0.12	0.14	0.23	0.37
ST DEV mm	0.06	0.11	0.01	0.01	0.05	0.01
RANGE min	0.54	0.432	0.108	0.126	0.198	0.36
max	0.792	0.9	0.126	0.144	0.27	0.378

Superfamily Mamilloporoidea Canu & Bassler, 1927

Family Mamilloporidae Canu & Bassler, 1927

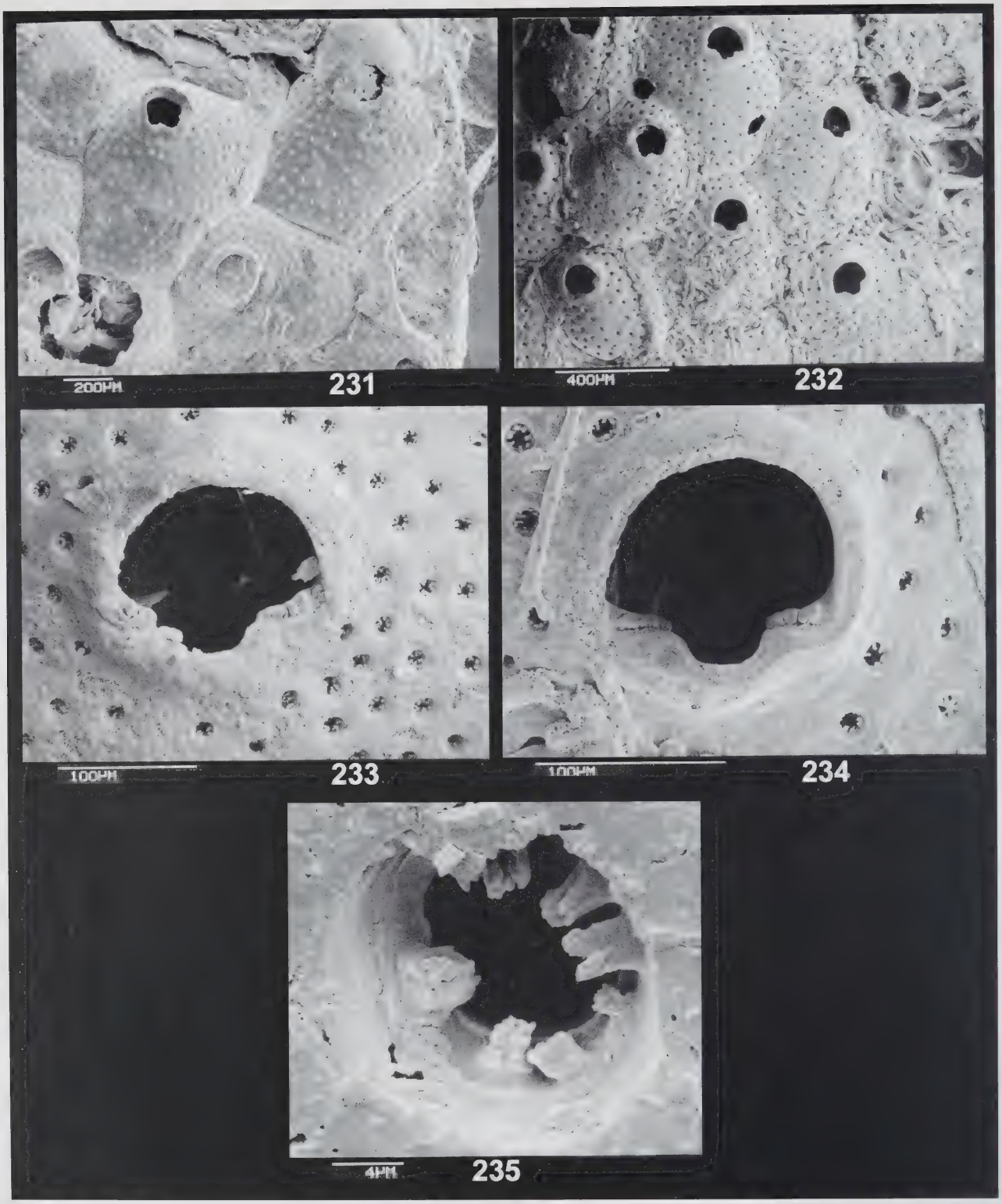
Genus *Mamillopora* Smitt, 1873

Mamillopora cupula Smitt, 1873
Figs. 236-243 (Smitt MCZ # 108, 137, 138)

Mamillopora cupula Smitt, 1873: 33, pl. VII, figs. 146, 147, a-c; Canu & Bassler, 1928b: 153, pl. 26, figs. 3-13, text fig. 35; Osburn, 1947: 46; Marcus & Marcus, 1962: 305; Rucker, 1967: 831, fig. 16, f-i; Cadée, 1975: 329.

Material Examined: All Syntypes. MCZ Smitt no. 108. *Mamillopora cupula*, Sm. May 11. Cast No. 1, Off Conch Reef, 30 fms, Pourt. 1869. MCZ Smitt no. 111. *Mamillopora cupula*, Sm. Jan. 16. Cast No. 5, W. of Tortugas, 36 fms. Pourt. 1869. MCZ Smitt no. 137. *Mamillopora cupula*. March 21, 1869, Cast No. 6, Off Carysfort reef, 48 fms. MCZ Smitt no. 138. *Mamillopora cupula*. Sm. March 21, 1869, Cast no. 2. Off French reef, 45 fm. MCZ Smitt no. 177. *Mamillopora cupula* Sm. March 21, Cast No. 7, Off Carysfort reef, 40 fms. Pourt 1869.

Description: Colonies are free-living about 1-3 mm in height, 2-4.5 mm in basal diameter, saucer to cup-shaped, with autozooids and avicularia on the convex outer surface (Figs. 231-232). Zooids are erect, the frontal surface oval in shape, imperforate except for marginal pores. The orifice is hoof-shaped, with a greater than semicircular distal portion divided from an equally broad U-shaped sinus by a pair of stout, pointed condyles. The orifice is surrounded by a low, rounded, somewhat tuberculate peristome. Small avicularian zooids, their openings hoof-shaped like those of autozooids, but smaller, are scattered between autozooids. Avicularian mandibles are variable in size, and semicircular to subtriangular in shape. The ovicell is large, embedded, wider than it is high, its surface punctured by many small pores, and its opening closed by the operculum. Ovicelled zooids are found on the outer rims of colonies and have larger orifices than autozooids (Fig. 240).



Figures 231-235. *Cribellopora constellata*. Fig. 231. Three zooids with cuticle. One on upper right with ovicell. Smitt MCZ # 118. Fig. 232. Group of skeletal zooids, showing pores. Smitt MCZ # 128. Fig. 233. Close-up of orifice and stellate pores. Smitt MCZ # 128. Fig. 234. Another zooid. Close-up of orifice and stellate pores. Smitt MCZ # 128. Fig. 235. Close-up of a single pore, showing denticles. Smitt MCZ # 128.

Bubble shaped kenozooids with central pores that may develop into calcified tubes occur on the interior surface (Figs. 241-243).

Discussion: Smitt (1873: 34) states that the species was "taken by Pourtales at seven different localities in the Floridan sea...." The MCZ collection has 5 specimens, all of them syntype material. The specimen scanned for most of the figures here is a large, somewhat abraded and bored specimen from container no. 138. Apparently the species has not yet been studied alive. Canu & Bassler (1928b: 153-155) hypothesized a floating life for this species claiming that "It can at its pleasure arise or descend", based on the fact that dead colonies can float on the water surface, but this is fantasy. The numerous avicularia suggest possible locomotory ability, but they do not occur in as regular a pattern as in other free-living species. Marcus & Marcus (1962: 302) noted, "that the short, semicircular avicularian mandibles of the basal side should produce a locomotory effect by opening and closing is not easy to conceive." Cook & Chimonides (1981) suggest that the basal kenozooidal structures of this species may produce rootlets which anchor the colony in sand.

Osburn (1952: 517) listed the species from the Eastern Pacific from the Gulf of California to the Galapagos. However, his illustrations (pl. 64, figs. 10, 11) show what appears to be a different *Mamillopora* species in which the ovicell is longer than wide and is not porous, and in which the avicularia have bluntly triangular, rather than rounded mandibles.

Distribution: Cape Hatteras to Florida, the Caribbean, and the Gulf of Mexico. Maturo's study of the southeast coast shelf found that it was not as abundant as the other lunulitiform species, and its distribution was chiefly limited to the outer part of the shelf (Maturo 1968).

Mamillopora cupula	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav	Loovz	Woovz	Lavm	Wavm
N	18	18	18	18	14	14	18	18	14	14	18	18
MEAN mm	0.37	0.35	0.16	0.13	0.33	0.4	0.18	0.14	0.18	0.17	0.08	0.07
ST DEV mm	0.07	0.03	0.01	0.01	0.05	0.05	0.02	0.02	0.02	0.05	0.01	0.02
RANGE min	0.27	0.288	0.144	0.108	0.27	0.342	0.126	0.108	0.144	0.126	0.072	0.054
max	0.486	0.396	0.198	0.144	0.414	0.45	0.216	0.162	0.216	0.342	0.099	0.099

Family Cleidochasmatidae Cheetham & Sandberg, 1964

Genus *Schedocleidochasma* Soule, Soule, & Chaney, 1991

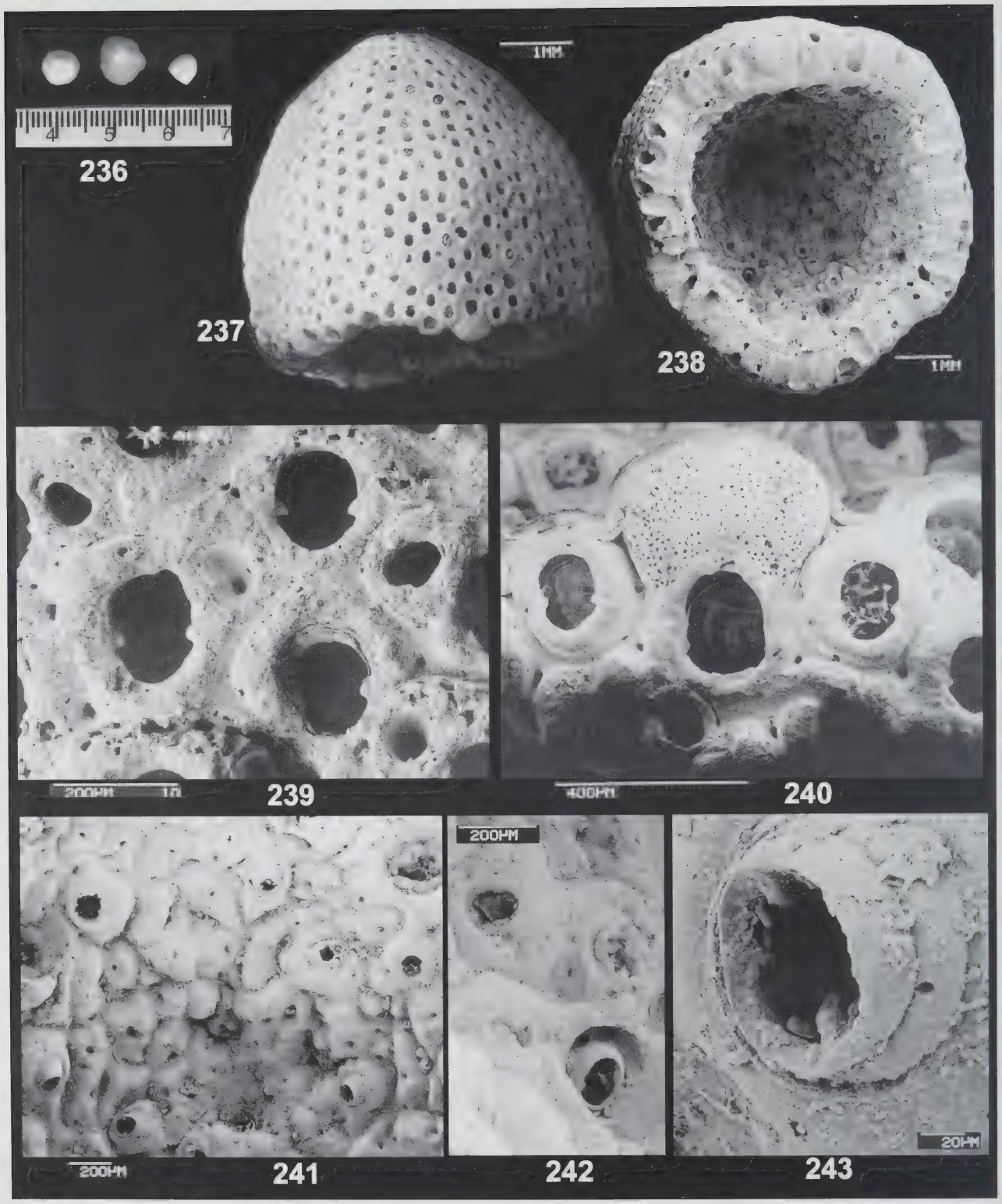
Schedocleidochasma cleidostomum (Smitt), 1873 new combination
Figs. 244-246 (Smitt MCZ #90)

Lepralia cleidostoma Smitt, 1873: 62, pl. XI, figs. 217-219.
Lepralia porcellana Osburn, 1914: 209. (NOT Busk 1860b: 283, pl. 31, fig.3).
Hippoporina cleidostoma Canu & Bassler, 1928b: 104, pl. 9, fig. 7; pl. 32, fig. 6, text-fig. 18.
Hippoporina porcellana Osburn, 1940: 428; Shier, 1964: 633.
Cleidochasma porcellanum Cheetham & Sandberg, 1964: 1032, text-fig. 35; Long & Rucker, 1970: 19, fig. 4.2; Winston, 1982: 147, fig. 80.

Material Examined: Syntype. MCZ #. 90. *Lepralia cleidostoma.* May 1, 1868. Cast No. 7, 26 fms. [off Sombrero Key]. Pourt. [VMNH no. 3025.00 South Lido Beach, Lido Key, Sarasota Co., Florida. J. E. Winston, 22 July 2002. VMNH no. 2862.01. Spoil site #2, of S. side of Fort Pierce Inlet, St. Lucie Co., Florida. J. E. Winston, 31 July 2002.

Description: Colonies encrusting, unilaminar to multilaminar or mound-like, porcellanous, translucent, whitish to beige or pale peach in color. Zooids regularly hexagonal in primary layer to irregularly polygonal in frontally budded areas. Zooid surfaces slightly inflated. Frontal calcification smooth to sparsely granular and imperforate except for 3-5 marginal pores. Orifice keyhole-shaped, rounded distally with proximally directed condyles, and a narrow U-shaped sinus proximally. Single or paired adventitious avicularia may occur on frontal surfaces. They are located on an umbo below and lateral to the orifice and have sharp pointed, laterally directed mandibles (Figs. 245, 246), and pointed rostra with a trifoliate palate. Ovicell hyperstomial, prominent and delicately striated when newly formed, becoming granular and embedded in secondary calcification with age. Ovicells are imperforate, with a frontal area in the form of a thin curved edged plate between two lateral slits (Fig. 246). Ovicell opening narrowly transverse, not closed by operculum. Embryos of Florida colonies reddish-pink (Winston 1982).

Discussion: As Hayward & Cook (1983: 75) pointed out the "*Cleidochasma porcellanum*" of various authors is really a "widely distributed and very variable species complex" with a tropical-subtropical distribution. Material from west Africa, Florida and the northern Gulf of Mexico agree fairly closely with the original description and with material from Madeira (Busk 1860) according to Cheetham & Sandberg (1964), so use of the 1860 Busk name has seemed reasonable up to now.



Figures 236-243. Fig. 236. *Mamillopora cupula*. Three colonies, life-sized. Left and center colonies, Smitt MCZ # 108. Colony on right, Smitt MCZ # 137. Fig. 237. Side view of dome shaped colony. Smitt MCZ # 138. Fig. 238. Basal view of same colony. Smitt MCZ # 138. Fig. 239. Group of zooids, showing orifice shape, and avicularia. Smitt MCZ # 138. Fig. 240. Ovicelled zooid. Smitt MCZ # 138. Fig. 241. Basal side of colony, showing bubble-shaped kenozoids. Fig. 242. calcified tubes projecting from kenozoid openings. Smitt MCZ # 138. Fig. 243. Kenozooid tube. Smitt MCZ # 138.

However, Florida specimens do show some distinctive characteristics, a rougher, more granular texture, trifoliate avicularian palate, a more shallow and broadly U-shaped sinus that seem to warrant their separation. The first two characters could possibly result from increasing secondary calcification due to aging of the colony or its response to heavy grazing, but the difference in orifice shape is likely genetic. The one specimen in the Smitt MCZ Collection is illustrated here with SEMs taken at low Kv of uncoated material, still covered with dried tissue, but showing the chief characters. Smitt's figs. 217 and 219 are also of tissue covered specimens. See Winston (1982), fig. 80 for SEM of cleaned zooids of a Florida specimen very similar to that illustrated in Smitt's pl. XI, fig. 218.

There seem to be several members of this species complex in the Caribbean-Gulf of Mexico region. "*C. porcellanum*" specimens from Belize (Winston, 1984: 28, fig. 56) have a flatter frontal surface with a coarsely granular texture, small paired, distolaterally directed avicularia, a shallow sinus, and trifoliate avicularian palates, as well as three stout tubercles of calcification (one below and two above) in the vicinity of the orifice. These specimens resemble the specimen illustrated in Canu & Bassler (1928b) pl. 9, fig. 7 (from Albatross Sta. D, 2405, Gulf of Mexico). The NMITA web page shows what appear to be additional Caribbean species in this complex, including some that are more smoothly calcified and "*porcellanum*" like, and some with a narrower, more V-shaped sinus. Marcus's specimens from Santos, Brazil look rather different also, ovicells are distinctly striated and avicularia are more distolaterally directed than those of Florida specimens.

Recently, Soule, Soule, & Chaney (1991) and Cook & Bock (1997) have revised the genera and species included in the Cleidochasmatidae. Smitt's *cleidostoma*, like *porcellanum*, appear to belong in *Schedocleidochasma* as defined by Soule et al. This genus is still assigned to the family Cleidochasmatidae as instituted by Cheetham & Sandberg (1964), along with *Characodoma* Maplestone 1900 (senior synonym of *Cleidochasma* according to Cook & Bock (1997), *Plesiocleidochasma*, *Metacleidochasma* and several others. Other genera fomerly assigned to the family, including the "*Cleidochasma contractum*"-like species, are more closely related to genera like *Rhynchozoon*, and have been transferred to the Phidoloporidae and placed in the genus *Stephanollona* Duvergier, 1920.

Distribution: Cape Hatteras to Florida, Caribbean, and Gulf of Mexico.

Schledocleidochasma cleidostomum	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	6	6	6	6	4	4	6	6
MEAN mm	0.44	0.36	0.12	0.1	0.16	0.18	0.12	0.06
ST DEV mm	0.03	0.02	0.01	0.01	0.01	0.01	0.02	0.01
RANGE min	0.396	0.342	0.108	0.09	0.144	0.18	0.108	0.045
max	0.468	0.396	0.126	0.117	0.18	0.198	0.144	0.072

Genus *Gemelliporina* Bassler 1936

Gemelliporina glabra (Smitt) 1873
Figs. 247-256 (Smitt MCZ # 80. NMNH unnumbered)

Gemellipora Forma *glabra* (typica) Smitt, 1873: 37, pl. XI, figs. 208-210. NOT: Forma *striatula* (fig. 207) = *Trypostega venusta* (Norman, 1864).

Gemellipora glabra Busk, 1885: 176, pl. 25, fig. 3; Canu & Bassler, 1928b: 98, pl. 12, figs. 1-7, text-fig. 16.

Gemelliporina glabra Marcus, 1939: 140, ext. IX, fig. 14 A, B; Osburn, 1940: 426; 1974: 30.

Material Examined: Syntype. Smitt MCZ # 80. *Gemellipora glabra.* Jan. 16, 1869. Cast No. 5 W. of Tortugas, 36 fms. Pourt. MCZ cat. no. 97. *Gemelliporina glabra.* 24 Apr. 1872. Western Florida, 20 fms. Bache. NMNH. [unnumbered]. *Gemelliporina glabra.* Fowey Light, 15 mi. S. of Miami, Atlantic, 40 fm. *Gemelliporina glabra.* VMNH no. 2622.00 Juno Ledge site, Florida. *Gemelliporina glabra.* M & D. Littler, 18 July 1999. VMNH No. 2583.00 Spanish Anchor site, off West Palm Beach Florida M & D. Littler, 18 July 1999. VMNH No. 2875.00 off West Palm Beach Florida M & D. Littler, 20 July 2002.

Description: Colony erect, consisting of cylindrical, six-serial branches (Fig. 247) arising from an encrusting base. Fig. 248 shows a branch in cross section. Zooids are oval to claviform, the demarcation between adjacent zooids in young zooids visible as a very faint line, in older zooids only as a row of marginal pores. Calcification is thick, granular to pustulose, perforated by the small marginal, plus a few additional frontal, pores. Near the growing tip pores are slightly larger and sunken in tubercular calcification (Fig 248). Away from the growing tip secondary calcification smooths and fills in zooid surfaces and erases most pores (Fig. 254). The orifice is keyhole-shaped with a rounded distal end, and a small, curving, V-shaped sinus, delimited by narrow condyles, at its proximal end. Five hooked oral spines occur on the frontal surface, surrounding the distal end of the orifice (Fig. 253). Scattered oval avicularia with complete crossbars are found on zooid surfaces. Mandibles are directed latero-proximally, and the raised semicircular

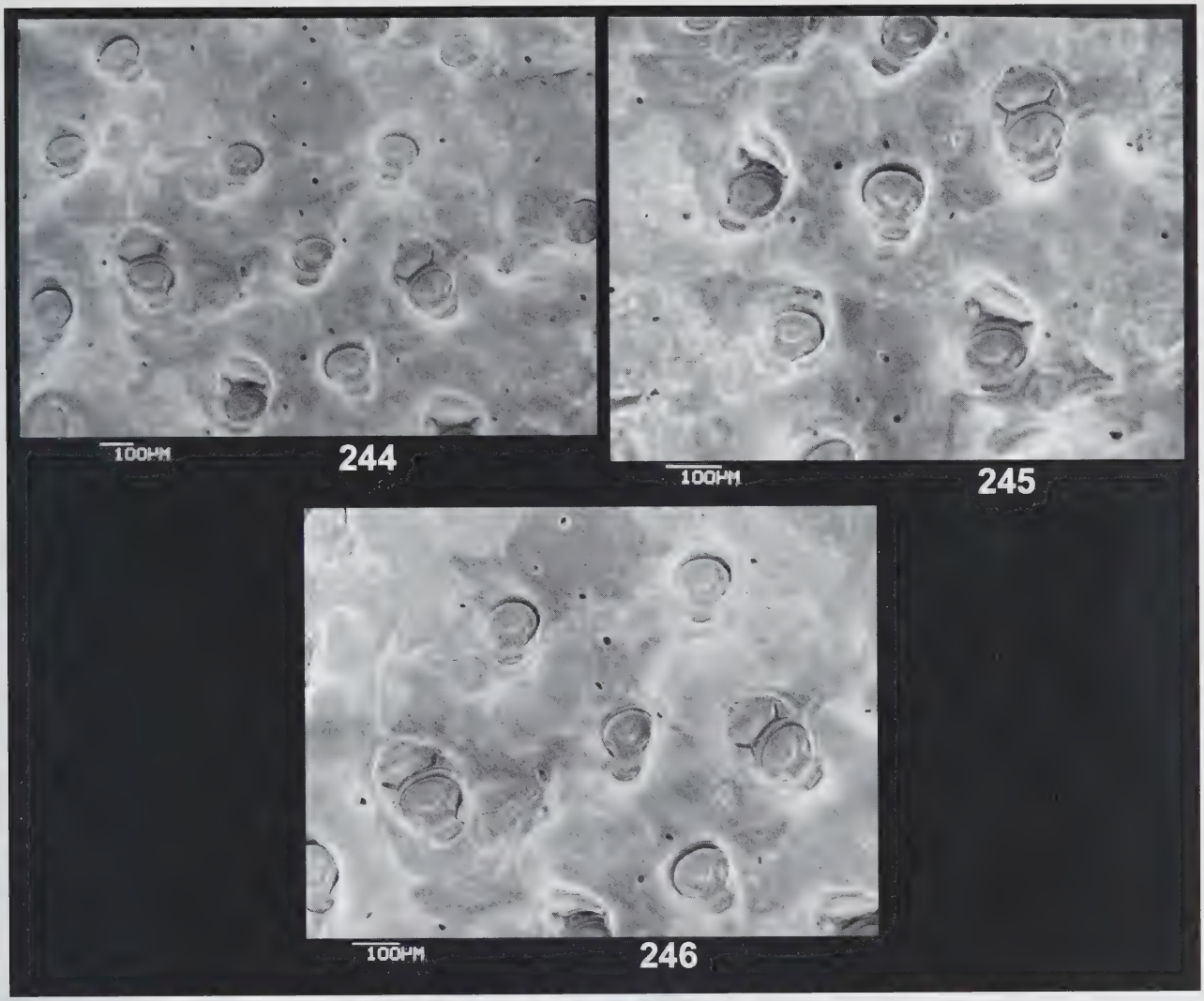
rostra project obliquely outward from the branch (Fig 252). Ovicells are globular, embedded in frontal calcification with a median longitudinal depression or pore, and show a smooth rim of calcification around their opening. No ovicells occurred in the MCZ specimen illustrated, the only sample of the species in the MCZ Smitt collection; they have been illustrated here with an ovicelled NMNH specimen (Fig. 255) from Florida.

Discussion: Bassler created a new genus for this species: "species with key-hole like aperture, hyperstomial ovicell and tremocystal frontal with *Gemellipora glabra* Smitt, 1873, a common species in the Gulf of Mexico, as the type" (Bassler, 1936: 161). Osburn 1952: 357-8 state that frontal is not a tremocyst, but a pleurocyst, with 1-2 rows of areolar pores. He also added that the frontal wall was very thick with tubular pores, stout oral spines, and the "ovicell globular, but soon covered by the distal pleurocyst except for a median cicatrix." He included an additional species: *Gemelliporina monilia* from the Gulf of California in the genus.

The family placement of the species remained uncertain for years after its discovery. Canu & Bassler (1928b) and Osburn (1940) placed it in the Schizoporellidae, while Osburn in his 1952 work placed it in the Hippoporinidae, placed next to the *Hippoporidras* (which also have a keyhole shaped orifice). The most reasonable family affiliation for the species appears to be Cleidochasmatidae. The orifice shape of *Gemelliporina* is morphologically very similar to that of cleidochasmatids, particularly *Characodoma* (eg., in Gordon & d'Hondt 1997). The nature and position of the oral spines matches well. The morphology of the avicularia fit this family, as does the wall structure. The ovicell is not the same, but ovicells are quite varied among members of this group.

Distribution: Cape Hatteras (Maturo 1968) to Brazil. Gulf of Mexico. On the east coast of Florida the species seems to be associated with subtidal or continental shelf algae. Winston & Eisman (1980: 70) recorded it from continental shelf algae (40-90 m) and more recent collections of algae from off the Palm Beach area (VMNH material above) also contained the species. In Brazil, Marcus (1939) found it on *Sargassum* near the low tide mark.

Gemelliporina glabra	Lz	Wz	Lo	Wo	Lavinterz	Wavinterz	Lav mand	Wav mand
N	6	6	6	6	5	5	5	5
MEAN mm	0.82	0.53	0.19	0.11	0.37	0.28	0.11	0.1
ST DEV mm	0.04	0.05	0.01	0.01	0.1	0.02	0.02	0.02
RANGE min	0.756	0.45	0.18	0.099	0.27	0.27	0.09	0.072
max	0.882	0.576	0.198	0.117	0.54	0.306	0.126	0.126



Figures 244-246. *Schedocleidochasma cleidostoma* Smitt MCZ # 90. Fig. 244. Group of tissue covered zooids. Fig. 245. Another group of zooids, viewed frontally to show ovicell position. Fig. 246. Group of zooids, at a different angle to show ovicell frontal plate with slits.

Superfamily Celleporoidea Johnston, 1838

Family Colatooeciidae, new family

Diagnosis: Colony rigid, erect, and branching. Frontal wall perforated by large pores, with a frontal surface that thickens as zooids and colonies age. Spiramen apparent in developing zooids, joining with peristome and immersed in frontal wall in completely calcified zooids. Primary orifice oval, inmersed in a tubular peristome, secondary orifice level with frontal wall surface. Adventious avicularia with complete crossbars. Ovicells embedded in frontal surface, with a central membranous slit or oval area bridged by a "sieve" of delicate costae which interdigitate at the mid-point of the slit.

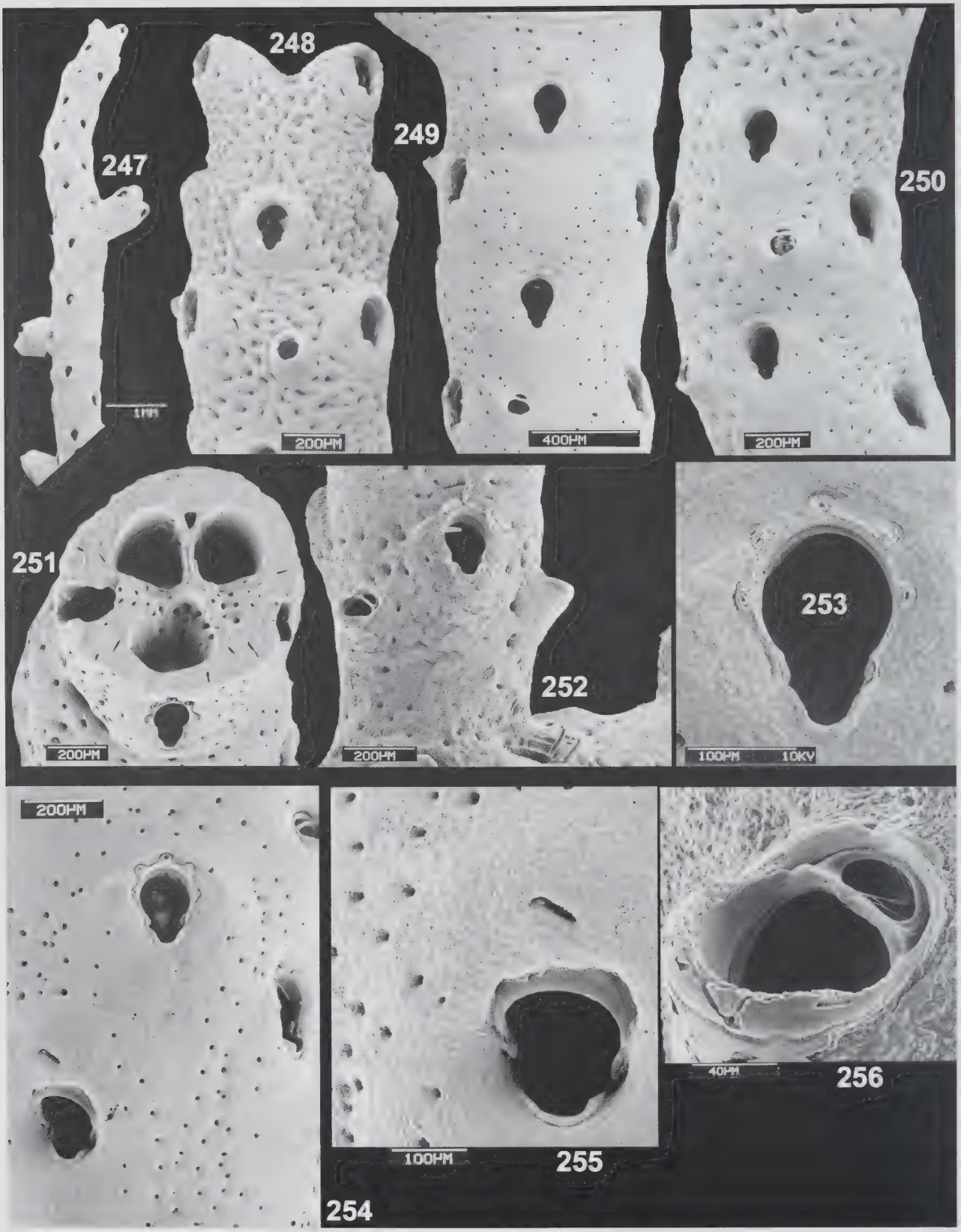
Type genus: Colatooecia, new genus

Genus *Colatooecia,* new genus

Diagnosis: Colony rigid, erect, and branching. Frontal wall evenly perforated by large pores, frontal surface thickening with development. Spiramen apparent in developing zooids, joining with peristome and immersed in frontal wall in completely calcified zooids. Primary orifice oval, becoming inmersed in a tubular peristome with secondary orifice level with frontal wall surface. Adventious avicularia with complete crossbars. Ovicells embedded in frontal surface, with a central membranous slit or oval area bridged by a "sieve" of delicate costae which interdigitate at the mid-point of the slit.

Type species: Porina serrulata Smitt, 1873. The genus also includes *Porina porosa* Canu & Bassler, 1919.

Etymology: Colato- from Latin colus = sieve, and oecium = brood chamber.



Figures 247-256. *Gemelliporina glabra*. Florida. Fig. 247. Branching colony fragment. Smitt MCZ # 80, Syntype. Fig. 248. Growing tip of branch. Smitt MCZ # 80. Fig. 249. Zooids on branch. Smitt MCZ # 80. Fig. 250. Zooids and an avicularium. Smitt MCZ # 80. Fig. 251. Cross-section of branch. NMNH specimen. Fig. 252. Zooid, showing oral spines and avicularia. Smitt MCZ # 80. Fig. 253. Close-up of orifice. Smitt MCZ # 80. Fig. 254. Group of zooids. Ovicelled zooid on lower left, note pore. NMNH no. Fig. 255. Close-up of same ovicell. NMNH specimen. Fig. 256. Close up of avicularium. Smitt MCZ # 80.

Colatooecia serrulata (Smitt) 1873
Figs. 257-261 (Smitt MCZ #73)

Porina serrulata Smitt, 1873: 27, pl. V, figs. 116-125.
Cigclisula serrulata Canu & Bassler, 1928b: 125, pl. 20, figs. 1-14, text-fig. 24.
Spiroporina? serrulata Cheetham & Sandberg, 1964: 1027, text-figs. 26, 27.

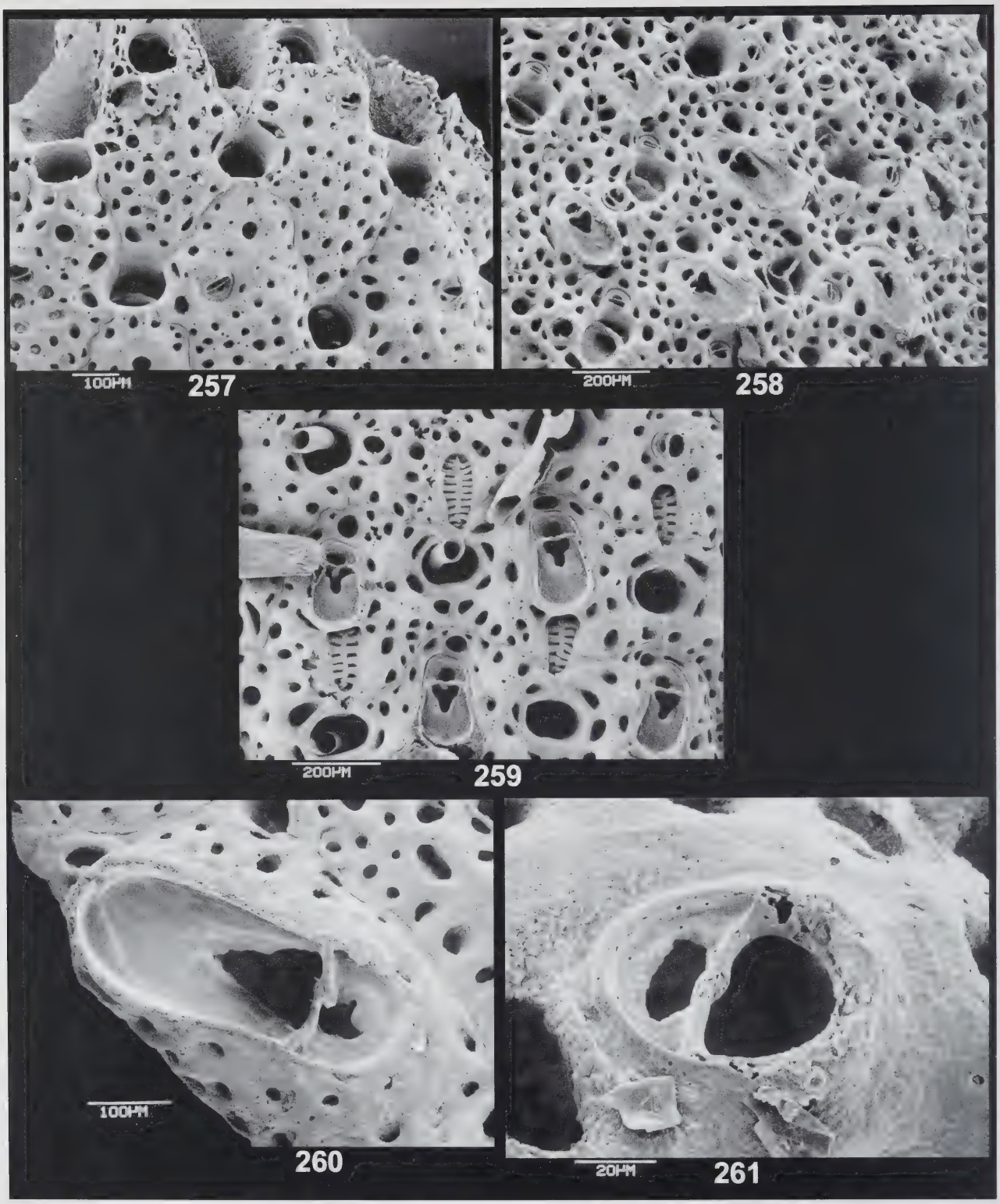
Material Examined: Syntypes. MCZ Smitt # 73. *Porina serrulata.* Jan. 16, 1869. Cast No. 6, W. of Tortugas, 36 fms. Pourt. MCZ Smitt # 76. *Escharella jacotini* on *Porina serrulata* [ink label]. April 3, 1869. Cast No. 3. Off French Reef, 44 fms. Pourt. MCZ Smitt # 93. *Porina serrulata* verte! Type for Smitt, Floridan Bryozoa, Figs. 116-120. January 16, 1869. Cast No. 12, W. of Tortugas, 42 fms. Pourt.

Description: Colony erect, rigid, forming narrow, bilaminar, bifurcately branching fronds, given a serrate appearance by large spatulate avicularia. Zooids at growing edge (Fig. 257) rhombic in shape, becoming irregular with increasing calcification, the secondary calcification protruding across original zooid margins, so that peristomes of each zooid appear almost cut off from the rest of the zooid (Fig. 259). Frontal wall thickly calcified, smooth to finely granular in texture, penetrated by a number of large pores. The narrow groove marking adjacent zooid walls is clear at the growing tips of branches but becomes more difficult to see as calcification proceeds. Primary orifice almost round; as zooids mature it becomes embedded in frontal calcification, with a smooth walled oval peristome, ending in a secondary orifice even with the zooid frontal surface. In zooids near the growing edge a large round spiramen can be seen in the center of the frontal wall about one third of the way proximal from the distal rim (Fig.257). It joins with the peristome and is covered by frontal wall calcification as zooids continue to calcify. There are two types of avicularia. Small oval avicularia (Fig. 261) with pivotal crossbars and with serrated rostra raised at an angle from the frontal surface are scattered on zooid surfaces, their mandibles oriented in various directions. Larger spatulate avicularia (Fig. 260) occur more sporadically, but are common near ovicells. They are distinguished by complete crossbars and a mostly calcified palate with trifoliate distal and semi-circular proximal openings. Ovicells (Fig. 259) are almost completely embedded in frontal calcification and are visible as a narrow uncalcified slit or oval, shielded by two rows of delicate costae which interdigitate and fuse together at the mid-line of the opening.

Discussion: There is no problem with recognition of this distinctive species. However, its generic and family placement have been problematic ever since its initial description. Smitt called it *Porina.* Canu & Bassler (1928b: 125) placed it in their genus *Cigclisula*, but stated at the time that "This species differs very much from the genotype in the abesnce of the peristomial avicularia and in the form and nature of the operculum. It can in reality be considered as the type of a new genus of the same family...." However, as Cheetham & Sandberg (1964), who found fragments of this species in the mudlump fauna, pointed out, Hastings in her 1932 study of *Escharoides occulusa*, the type species of *Cigclisula,* rejected the placement of *serrulata* in this genus because of its spiramen. Cheetham & Sandberg placed *serrulata* questionably in *Spiroporina.* This was the best placement possible at that time. Thanks to the many SEM studies since that time we can now use characters visible by SEM to place it more closely with its relatives. The distinctive suite of characters found in the species include 1) a spiramen, 2) thick porous calcification, 3) ovicell with elongate membranous area with two rows of tiny costae, 2) all avicularia with complete crossbars and 5) a mostly calcified frontal wall on larger avicularia. Morphologically comparable avicularia are found only in the superfamily Celleporoidea (e.g., those of *Celleporina*, *Cellepora*, and *Turbicellepora* species). Species once placed in *Spiroporina* are now split up. The type species *Spiroporina vertebralis* (now *Porina vertebralis*) is currently placed in the family Porinidae, superfamily Schizoporelloidea (Gordon 1984). However, other species are now placed in the genus *Galeopsis* in the Celleporidae. And, although most celleporoid genera have walls completely calcified except for marginal pores, at least one *Galeopsis* species, *Galeopsis polyporus* (Gordon, 1984: 117, pl. 46; 1989, pl. 36, A-G), has a frontal wall with large pores similar to that of *serrulata.* But Smitt's species is not a *Galeopsis.* The structure of its ovicell, the costae-blocked slit, is a unique character; similar ovicells are only known from one other genus, *Triphyllozoon,* in the related celleporoidean family Sertellidae (e.g., *Triphyllozoon gracile* Gordon & d'Hondt, 1997: figs 196, 198). Although most *Triphyllozoon* have branching slits, their costate structure is identical. Thus, Smitt's *serrulata* as well as the fossil Caribbean species, *C. porosa* (Canu & Bassler 1919:94, pl. 6, figs. 22,23; SEM available on NMITA website) seem to fall somewhere between the Sertellidae and Celleporidae in the Celleporoidea. However, their unique combination of characters, as well as the lack of some characteristics found in the existing genera, seems to warrant their being placed in a new and separate genus and family.

Distribution: Cape Hatteras to Florida and Gulf of Mexico.

Colatooecia serrulata	Lz	Wz	Lo	Wo	Lov	Wov	Lav oval	Wav oval	Lspat av.	Wspat. av.
N	12	12	12	12	6	6	6	6	10	10
MEAN mm	0.75	0.35	0.09	0.12	0.23	0.26	0.06	0.05	0.27	0.12
ST DEV mm	0.09	0.04	0.01	0.02	0.02	0.02	0.02	0.01	0.04	0.01
RANGE min	0.612	0.27	0.072	0.108	0.198	0.234	0.045	0.036	0.216	0.108
max	0.9	0.396	0.09	0.162	0.27	0.27	0.09	0.072	0.342	0.144



Figures 257-261 *Colatooecia serrulata.* Smitt MCZ #73. Fig. 257. Zooids at growing edge of branch. Fig. 258. Group of zooids. Fig. 259. Ovicelled zooids. Note the tubes fouling some zooids of this skeletal, dead colony. Fig. 260. Close-up of large spatulate avicularium. Fig. 261. Smaller ovoid avicularium

Family Celleporidae Johnston, 1838

Genus *Pourtalesella,* new genus

Diagnosis: Frontal shield thickly and smoothly calcified, with scattered frontal pores. Primary orifice with a sinus. No spines except on ancestrula. Ovicells hyperstomial, embedded in the distal zooid, with a large imperforate marginally perforated entozooidal area surrounded by an imperforate ectooecium; ovicell opening above the operculum and separate from it. Adventitious avicularia usually adjacent to orifice. Basal pore chambers present.

Type species: *Schizopodrella incrassata* Canu & Bassler, 1928. The genus also includes *Schizoporella rugosa* Osburn, 1940, *Stephanosella alipioi* Marcus, 1955, *Schizoporella carvalhoi* Marcus, 1955, and *Schizoporella cornuta,* sensu Cook, 1985.

Etymology: Named after Count Louis F. de **Pourtalès,** pioneer of deep sea dredging in America and collector of the Floridan specimens studied by Smitt. Born in Neuchâtel, Switzerland, in 1824, Pourtalès was an early student of Louis Agassiz's. He accompanied him to the United States, and, after working as his assistant at the MCZ for several years, obtained a position with the United States Coast Survey. Pourtalès was deeply interested in the study of benthic biology and geology. He described a number of species of invertebrates dredged during the coast survey cruises, including 6 species discussed by Smitt. He was appointed keeper of the MCZ after Agassiz's death, and at the time of his own death at age 57, he had completed many publications on foraminiferans, holothurians, and deep sea corals and was working on alcyonarians.

Pourtalesella incrassata (Canu & Bassler) 1928
Figs. 262-265 (Smitt MCZ # 151)

Hippothoa biaperta Smitt, 1873: 46, In Part, pl. VIII, figs. 175-176. NOT figs. 173-174 = *Cleidochasma contractum* (Waters). NOT *Eschara biaperta* Michelin, 1841-2: 330.

Schizoporella biaperta Osburn, 1914: 207.

Stephanosella biaperta Canu & Bassler, 1923: 99, In Part (pl. 8?).

Stephanosella (Schizoporella) biaperta Osburn, 1927: 6.

Schizopodrella incrassata Canu & Bassler, 1928b: 93, pl. 9, figs. 1-4 (NOT *Schizoporella incrassata* Hincks 1882).

Schizoporella incrassata Osburn, 1940: 422.

Schizoporella (Stephanosella) biaperta Osburn, 1947: 29.

Schizoporella cornuta Maturo, 1957: 50, figs. 54-55; Shier, 1964: 628; Winston, 1982: 144, fig. 74. NOT *Reptescharellina cornuta* Gabb & Horn, 1862: 147.

Material Examined: Smitt MCZ # 14. [not identified by Smitt. *Pourtalesella incrassata* on underside of one of *Cupuladria biporosa* colonies from this sample]. May 20, 4RM, 29 fms. Pourt. Smitt MCZ# 21. *Hippothoa biaperta.* Inside fishing ground off Cape Fear, Kid Bar (?), 17 fm. Pourt. 1868. Smitt MCZ #24. *Hippothoa biaperta* with *Porellina ciliata.* May 6, 1868. Cast No. 7 [off American Shoal], 98 fms. Pourt. Smitt MCZ#56. *Hippothoa biaperta* and *Cellepora avicularis* on *Lepralia* sp. Inside fishing ground off Cape Fear Riv. Bar, 17 fms. Pourt. 1868. Smitt MCZ # 86. *Hippothoa biaperta* and *Cellepora angularis.* Off Cape Fear, Bald Head Light NNE, 14 m[?], 60 fms. Pourt. 1869. Smitt MCZ# 151. *Porellina ciliata* and *Hippothoa biaperta* [no date]. Off Cape Fear, Bald Head Light NNE 14 m, 9 fms. Pourt. 1869. Smitt MCZ# 161. *Hippothoa biaperta* and *Cellepora avicularis.* 17 fms. Inside fishing Ground of Cape Fear Riv. Smitt MCZ # 172. *Hippothoa biaperta.* Off West Bar, Cape Fear River, 7 fms. Pourt. 1868. USNM 7585. Holotype. *Schizopodrella incrassata.* Gulf of Mexico Alb. Sta. 2405, 28°45' N, 85°2' W, 30 f. USNM 68569. *Schizopodrella marginata.* Holotype. Pl. 30, figs. 4, 5. Pliocene (Waccamaw Marl) [now considered Pleistocene] Waccamaw River, Horry CO., S. C. VMNH no. *Schizoporella biaperta* Walton Rocks, South Hutchinson Island, Florida.. MCZ no. 630. *Buffonellaria divergens. Blake* no 26, 110 fms. 24°37.5' N, 83°36.0' W (S of Tortugas). USNM no. 7459. Plesiotypes. *Buffonellaria divergens* Alb. 2167, off Havana, Cuba. USNM 7460. Holotype. *Buffonellaria reticulata.* Canu & Bassler. Alb. Sta.D 2405, Gulf of Mexico, 28°45' N, 85°2' W, 30 fm.

Description: Colonies encrusting, unilaminar to multilaminar, sometimes developing into erect bilaminar fronds (Fig. 262). Living colonies pink to salmon color. Zooids oval to hexagonal or polygonal, boundaries between them faint wavy lines, becoming indistinct with increasing calcification (Fig. 264). Frontal surface with heavy, smooth textured calcification, perforated by about 20 round embedded pores proximally, and with the whole frontal wall becoming increasingly irregular with age due to secondary calcification. Orifice slightly more than semicircular anteriorly, with rounded condyles, and a shallow V-shaped proximal sinus (Figs. 264, 265). Paired or single oval avicularia, with serrated rostra and complete crossbars, are raised at about a 45° angle, just below and beside the orifice, their mandibles directed distolaterally (Fig. 264). Additional avicularia, oriented at various angles may be found on or near ovicelled zooids (Fig. 263). Ovicell hyperstomial, globular and prominent, with a smooth heavily calcified outer rim, and a round radially grooved central area, the grooves ending in pores under the rim of the secondary (Fig. 263). Embryos red. Ancestrula tatiform, with four spines (Maturo, 1957: fig. 54).

Pourtalesella incrassata	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	18	18	18	18	18	18	18	18
MEAN mm	0.39	0.3	0.12	0.11	0.18	0.21	0.07	0.04
ST DEV mm	0.04	0.04	0.01	0.01	0.02	0.02	0.02	0.01
RANGE min	0.306	0.234	0.099	0.09	0.144	0.18	0.036	0.036
max	0.504	0.378	0.126	0.126	0.198	0.234	0.099	0.054

Discussion: Smitt's misidentification of this species in his "Floridan Bryozoa" has created a major problem for workers on the Western Atlantic bryozoan fauna. In the first place, Smitt lumped two species as *Hippothoa biaperta*. His figures 173-174 are clearly of *Stephanollona* species and will be discussed under that genus. Figures 175-176 show a second species he identified with the Miocene fossil *Eschara biaperta*, which was described from France by Michelin, and which Smitt seems to have considered conspecific with the Arctic species now called *Escharella biaperta* (Smitt),1868 (see Ryland 1969 for discussion). The species name *biaperta* has continued to be used for Western Atlantic specimens, but they have also been identified with the California fossil species *S. cornuta* and have been given at least two additional names by Canu & Bassler, as well. The species has also been put in different families and genera at different times. Thus, there are two sets of problems: one set dealing with specific placement – whether the species found from Massachusetts to the Caribbean and the Gulf of Mexico is different from the species described from Europe and the west coast of the U.S., and what name should be used for Smitt's material. The second set involves its family and generic placement and that placement may in turn affect the generic placement of a number of species from various parts of the world.

SEM studies show that on the U.S. east coast there is only one broadly distributed species (at least morphologically – genetic analysis may change this, of course). The east coast material should go by the name *incrassata*, based on Canu & Bassler's 1928 description of *Schizopodrella incrassata*. Since they introduced it as a new species, there is no conflict with the Hincks species *Schizoporella incrassata*, which from its figure appears to be a *Rhynchozoon* in any case. SEMS of Recent west coast material from California (Soule, Soule, & Chaney, 1995: 199, pl. 73A-D) show specimens having zooid orifices with a larger and more rounded sinus, more and smaller proximal frontal pores, more sharply triangular avicularian mandibles, and an ovicell with a granular calcified entooecium. The West Coast material should retain the name *cornuta*.

Pat Cook's Ghanaian *"Schizoporella cornuta"* (Cook, 1985: 161, pl. 17D, 21A) more closely resembles the West Atlantic form in terms of its frontal wall (though it looks to have more pores) and radially striated ovicells (though there isn't an SEM of an ovicell), but it has a shorter orifice with a shallower sinus and more pointed avicularia. It should probably be considered another species in the same genus. These three species, as well as the Florida and Caribbean species *Schizoporella rugosa* of Osburn (1940, p. 423) share a common suite of characters, appear to represent a single clade and should be placed in a single genus. None of them fit into *Schizoporella* as defined by its type species, *S. unicornis*. In fact, this group does not even belong in the family Schizoporellidae or superfamily Schizoporelloidea. Its closest relatives appear to be in the family Celleporidae, superfamily Celleporoidea. This was recognized by others. Canu & Bassler (1917) made up *Stephanosella* – but they made Michelin's *biaperta* the type – and as Ryland (1969) has shown, the Recent species that have been called *Stephanosella* are very different from the Miocene fossil.

Ryland recommended placing members of this group in *Buffonellaria*. But there are problems with that course of action, also. As currently defined (Hayward & Ryland, 1999: 356), *Buffonellaria* has a frontal wall with only marginal pores. That generic definition could be modified to include species with more porous frontal walls. However, there is second problem. The type species of *Buffonellaria* (also created by Canu & Bassler 1917) is *Buffonellaria divergens*, the *Hippothoa divergens* of Smitt. Smitt (1873: 47) actually described two species under *divergens*, one of which, his Forma *laxa* (his fig. 177), is a *Hippothoa* species, the other, his Forma *typica* (Fig. 179), is not the European *Buffonellaria divergens* now so well illustrated in H&R 1999). Smitt's Fig. 179 specimen was from fairly deep water (135 fms), it has only marginal pores, and while similar in overall morphology to the European material, it is smaller in zooid size, and has avicularia that are smaller relative to zooid size than those of European "*divergens*". There is no material of the species in the Smitt MCZ collection. However, there is cataloged MCZ material of a species identified as *Buffonellaria divergens* from a slightly later *Blake* cruise in the area of the Tortugas. It is a tiny, broken specimen, so only a few measurements could be made, and the colony lacked ovicells. Measurements of this specimen (MCZ no. 630) are summarized below:

Buffonellaria divergens MCZ no. 630	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	0.4	0.36	0.09	0.08
ST DEV mm	0.02	0.02	0.01	0.01
RANGE min	0.36	0.342	0.072	0.072
max	0.414	0.396	0.108	0.09

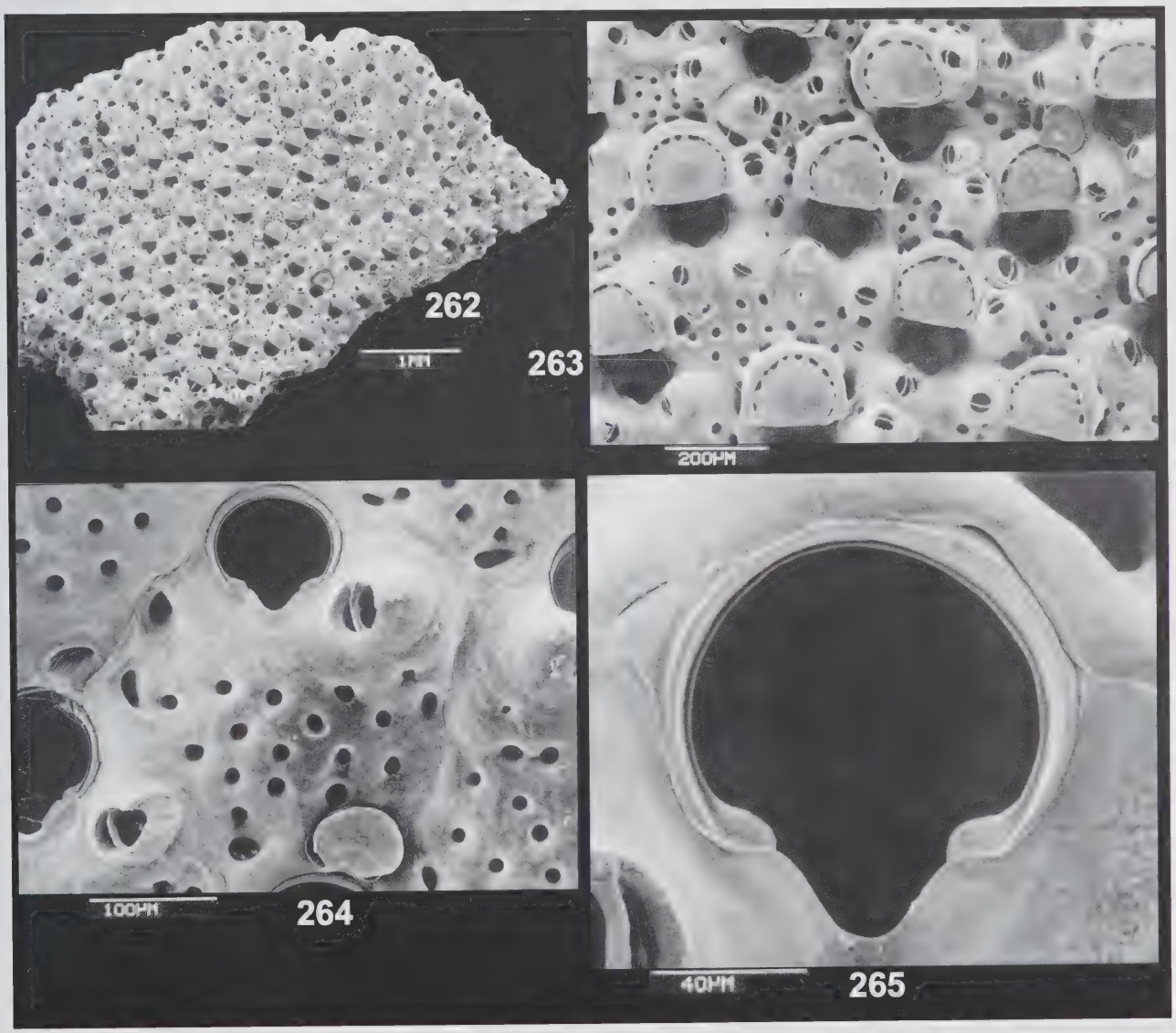
Canu & Bassler (1928b) give the only other reference to the species in the region. The specimens they called *Buffonellaria divergens* were from 130 and 201 fms off Havana, Cuba. Measurements of the two USNM colony fragments are summarized below:

Buffonellaria divergens USNM	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	12	12	12	12	8	8	12	12
MEAN mm	0.63	0.59	0.11	0.1	0.24	0.22	0.03	0.02
ST DEV mm	0.05	0.12	0.01	0.01	0.01	0.01	0.01	0.01
RANGE min	0.558	0.468	0.108	0.09	0.216	0.216	0.027	0.009
max	0.72	0.9	0.126	0.108	0.252	0.234	0.045	0.036

These specimens did have some ovicells developed. The ovicells were small, smooth, convex, and imperforate (see Canu & Bassler 1928b, pl. 8, fig. 7), with a slight raised keel around the proximal edges. The zooid frontal wall was also imperforate. There were single, small curved laterally directed triangular avicularia adjacent to the orifice, and on one ovicelled zooid there was a larger distally directed avicularium beside the ovicell. Their species is much larger than Smitt's material and perhaps belongs to a different species. It is closer in size to European "*divergens*" (measurements given in Hayward & Ryland, 1999, 356, 0.5-0.6 X 0.3-.4 mm in zooid length and width). They also described a second *Buffonellaria* species, "*reticulata*" (1928b, p.89), but examination of their specimens showed it to be *P. rugosa*.

In summary, *Buffonellaria* remains a valid genus. Based on the mostly imperforate frontal wall, and orifice and avicularian characters, the above two measured species, along with the E. Atlantic-Mediterranean species might remain in *Buffonellaria*, but European material will need a new name. The species with partly porous frontal walls can be separated into the new genus *Pourtalesella*.

Distribution: Cape Cod to Florida, Gulf of Mexico, Caribbean.



Figures 262-265. *Pourtalesella incrassata*. Smitt MCZ # 151. Fig. 262. Portion of a colony fragment. Fig. 263. Group of ovicelled zooids. Fig. 264. Close-up of non-ovicelled zooid showing orifice and avicularia position. Developing ovicell at lower right. Fig. 265. Close-up of orifice.

Family Celleporinidae Harmer 1957
Genus *Buskea* Heller, 1867

Buskea margaritacea (Pourtalès) 1867
Figs. 266-272 (Smitt MCZ #4, 64, 66,125)

Vincularia margaritacea Pourtalès, 1867: 110.
Cellepora margaritacea Smitt, 1873: 53, pl. IX, figs. 187-192.

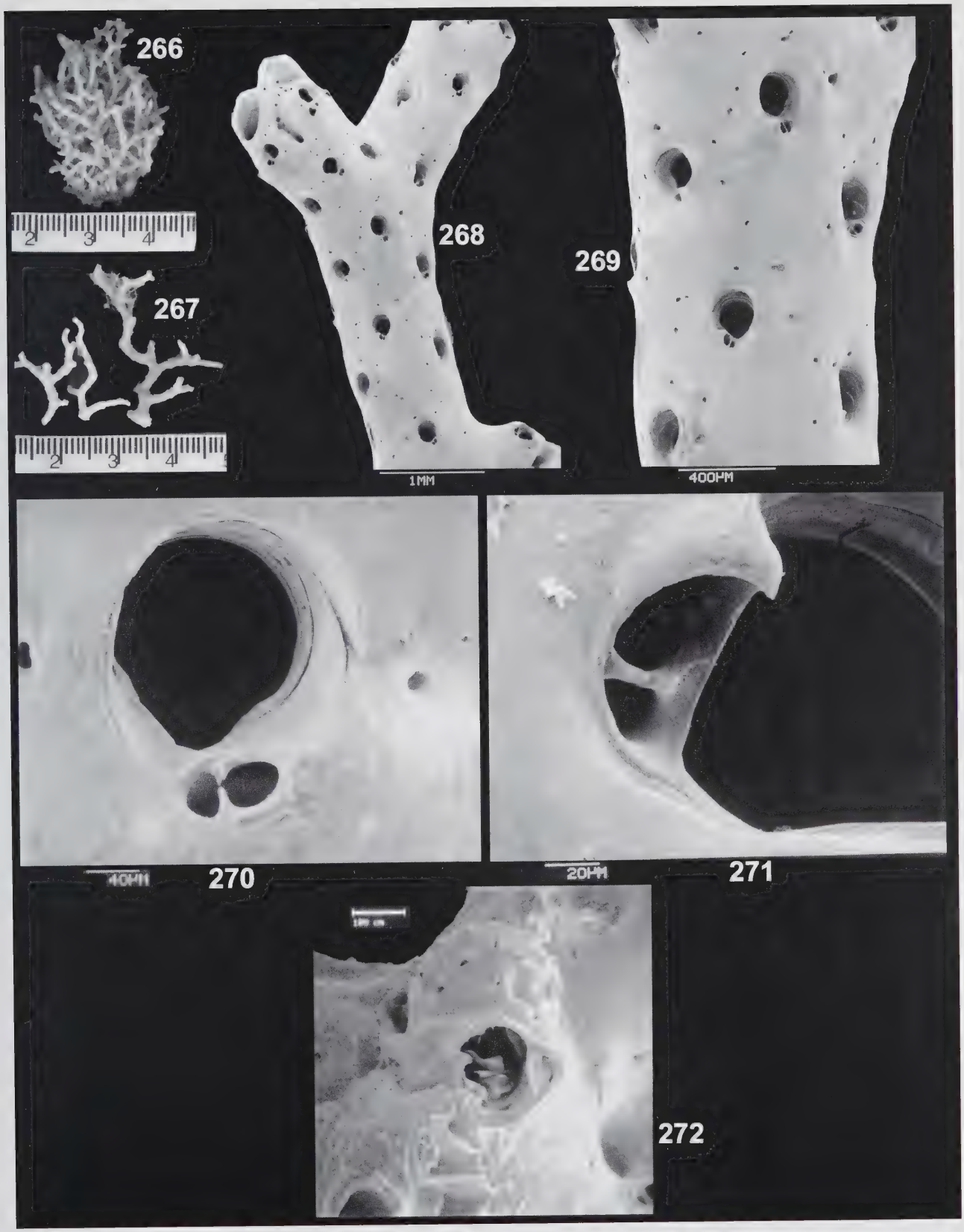
Material Examined: Smitt MCZ # 4. *Cellepora margaritacea* (Pourt.) May 11, 1869, Cast no. 6, Off Conch reef, 117 fms. Smitt MCZ # 8. *Cellepora margaritacea* (Pourt). [May 11?] D[redging] off Sand Key, 116 fms. Pourt. 1868. Smitt MCZ # 41. *Cellepora margaritacea.* May 11, 1868. 5th D[redging] [off Sand Key], 82 fms. Smitt MCZ # 42. *Cellepora margaritacea.* 5 D, May 9, 1868, 80 fms. Smitt MCZ # 44. *Cellepora margaritacea.* May 4th, 1868. 7th D[reding] [off Bahia Honda] 110 fm. Smitt MCZ #49. *Cellepora margaritacea.* May 16, 1868. Off Sand Key, 120 fm. Smitt MCZ #58. *Vincularia margaritacea* Pourt., *Cellepora margaritacea* Smitt. May 17, 1868. 7th D[redging] [off Sombrero] 11 fm. Smitt MCZ # 59. *Cellepora margaritacea* = *Vincularia margaritacea* Pourt. May 11, 1868. 7th D[redging] [off Sand Key] 103 fm. Smitt MCZ # 62. *Vincularia margaritacea* = *Cellepora margaritacea.* May 6, 1868. D[redging] 7 [off American Shoal] 98 fm. Smitt MCZ #64. *Cellepora margaritacea.* May 9, 1868. 12 Dredge [off the Samboes], 123 fm. Smitt MCZ #65. *Vincularia margaritacea* Pourt. *Cellepora margaritacea* Smitt. May 9, 1868 14th D[redging] [off the Samboes], 125 fm. Smitt MCZ #66. *Cellepora margaritacea.* Jan. 18, 1869. Cast No. 3, SW of Tortugas, 60 fm. Pourt. Smitt MCZ #120. *Cellepora margaritacea* = *Vincularia margaritacea* Pourt. April 21, 1869. Cast No. 1. Off Key West, 135 fm. Smitt MCZ #125. *Vincularia margaritacea* Pourt. *Cellepora margaritacea* Smitt. Verte! Jan. 16, 1869. Cast No. 13, W of Tortugas, 68 fms. Smitt MCZ # 130. *Cellepora margaritacea.* February 16, 1869. Cast No. 1, Off Boca Grande, 145 fms. Smitt MCZ #131. *Cellepora margaritacea.* February 16, 1869. Cast No. 4 and 5, Off Boca Grande, 125 fms. Smitt MCZ #132. *Cellepora margaritacea.* February 17, 1869. Cast No. 2, S W of sand Key, 125 fms. Smitt MCZ #139. *Cellepora margaritacea.* March 21, 1869. Cast no. 5, off Carysfort reef, 60 fms. Smitt MCZ #143. *Cellepora margaritacea.* May 7, 1869, Cast no. 6. Off Tennissee [sic] reef, 115 fms. Smitt MCZ # 146. *Vincularia margaritacea.* May 8, 1869. Off Aligator [sic] reef, 110 fms. Pourt. Syntype. Smitt MCZ # 170. *Vincularia margaritacea* Pourt. [May 17] 1867. Off Sand Key, Florida, 100 fms. [about 5 miles S.S.W. of Sand Key, Florida Keys, calcareous mud bottom]. Pourtalès described it as being "rather abundant off Sand Key in 100 fathoms..." Syntype material consists of 15 branch fragments. Smitt MCZ # 182. *Cellepora margaritacea.* Feb. 17, 1868. Cast No. 2, SW of Sand Key, 125 fms. Smitt MCZ #183. *Cellepora margaritacea* Pourt. [May 16?] 1868. 4 C, 5 D[redging]. Off Sand Key, 120 fms.

Description: Colonies are erect, cylindrical and branching, sometimes forming tangled mini-thickets of fused branches (Fig. 266, 267). Dried material is a glistening ivory white in color with golden-brown opercula. Zooids are elliptical in shape, covered with very faintly granular calcification, their outlines discernable only by the small marginal pores. The primary orifice, inside a short peristome, is rounded distally, with a shallow V-shaped sinus proximally (Fig. 270). An oral avicularium with a blunt triangular mandible is located in a proximo-lateral position at the outer edge of the peristome (Fig. 270, 271). According to Smitt, large spatulate avicularia may also occur (his Fig. 188). Ovicells are raised, globular and perforated by pores (Fig. 272). In contrast to the other common erect branching species in the collection, *Tessaradoma boreale*, in which ovicells occurred at growing tips of branches, ovicells of *Buskea margaritacea* occurred only on the older portions of branches.

Discussion: This was one of the most abundant species in the Smitt MCZ collection, present in 23 samples at depths ranging from 60 to 145 fms. The species has not been reported from the Caribbean since Pourtalès' time, but Osburn (1940) mentions colonies collected off Beaufort, N. C., and Maturo (1968) notes that it occurs along the S. E. continental shelf from Cape Hatteras to Florida.

Distribution: Cape Hatteras to Florida, Caribbean.

Buskea margaritacea		Lz	Wz	Lo	Wo	Lov	Wov	Lav oral	Wav oral	Llgav	Wlgav
	N	18	18	18	18	7	7	18	18	9	9
	MEAN mm	0.91	0.56	0.15	0.15	0.22	0.25	0.09	0.05	0.29	0.19
	ST DEV mm	0.14	0.09	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.01
	RANGE min	0.666	0.45	0.126	0.126	0.198	0.234	0.054	0.036	0.234	0.171
	max	1.17	0.702	0.171	0.18	0.234	0.27	0.126	0.072	0.342	0.198



Figures 266-272. Fig. 266. *Buskea margaritacea*. Thicket of branches. Life size. Smitt MCZ # 66. Fig. 267. *Buskea margaritacea*. Three branch fragments. Smitt MCZ # 64. Fig. 268. *Buskea margaritacea*. Branch fragment showing bifurcation. Smitt MCZ # 4. Fig. 269. *Buskea margaritacea*. Group of zooids. Smitt MCZ # 4. Fig. 270. *Buskea margaritacea*. Orifice and suboral avicularium. Smitt MCZ # 4. Fig. 271. *Buskea margaritacea*. Close-up of avicularium. Smitt MCZ # 4. Fig. 272. *Buskea margaritacea*. Ovicelled zooid. Smitt MCZ # 125.

Buskea minutiporosa (Canu & Bassler) 1928
Figs. 273-278 (Smitt MCZ# 144)

Cellepora tuberosa Smitt, 1873: 52, pl. IX, fig. 180. NOT *Cellepora ramulosa* f. *tuberosa* (d'Orbigny) Smitt, 1868: 31, 191 = *Turbicellipora smitti* (Kluge) 1962.

Cellepora minutiporosa Canu & Bassler, 1928b: 150, pl. 28, fig. 1.

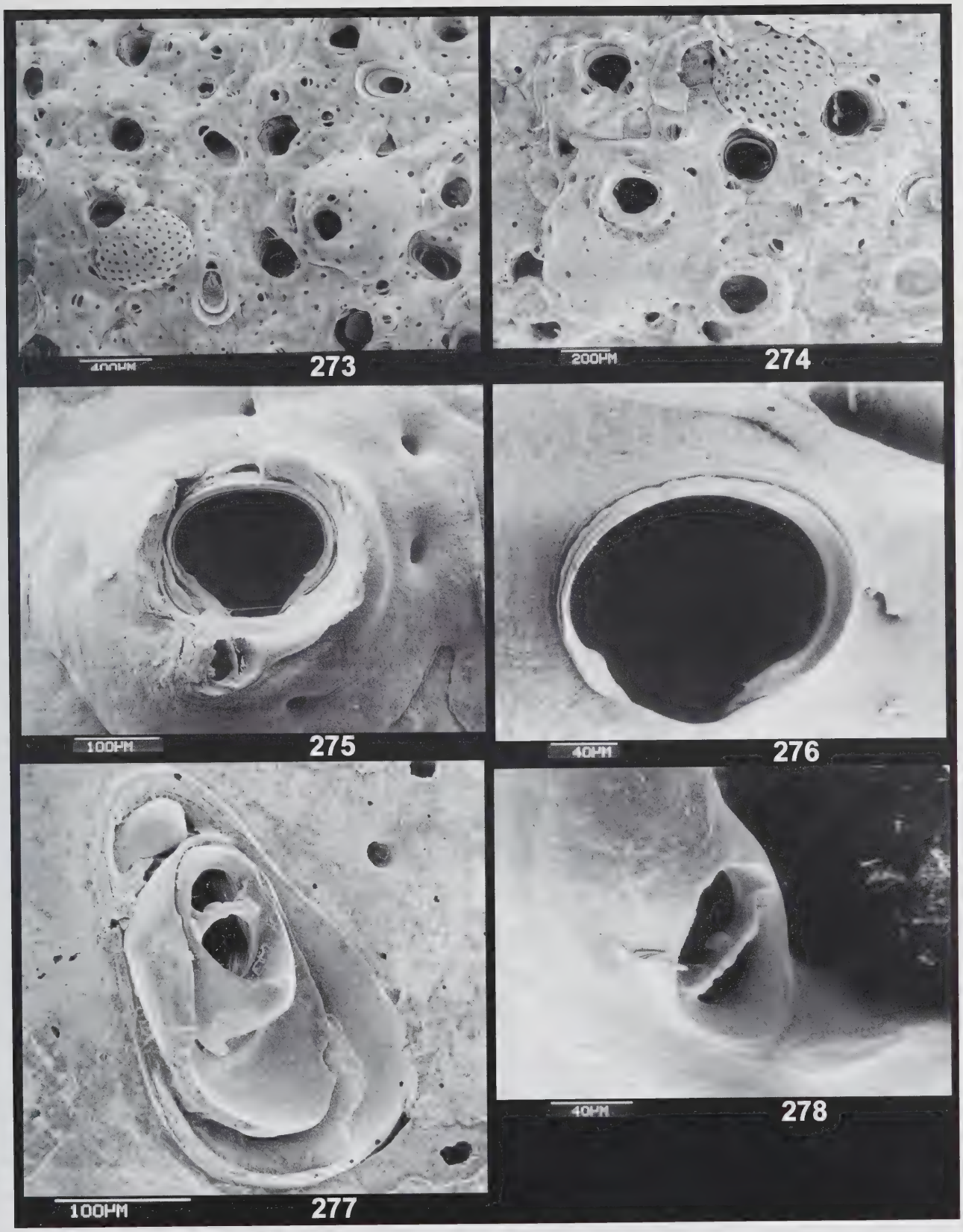
Material Examined: Smitt MCZ # 2 *Cellepora tuberosa.* May 1, 1868, 7 D[redging] [off Sombrero], 11 fm. Pourt. Smitt MCZ # 6. *Cellepora tuberosa.* May 2, 1868, #3 D[redging] [off Sombrero], 183 fms. Pourt. Smitt MCZ # 20. *Cellepora tuberosa.* May 1, 1868, 4 D[redging] [off Sombrero] [75? fm.] Pourt. Smitt MCZ # 78. *Cellepora tuberosa.* April 21, 1869. Cast No. 5, Off Key West, 120 fms. Pourt. Smitt MCZ # 82. *Cellepora tuberosa.* Feb.11, 1869. Cast No. 3, S. of Marguesas [sic], 140 fms. Pourt. Smitt MCZ # 85. *Cellepora tuberosa.* February 15, 1869. Casts No 4 et 5, Off Boca Grande, 125 fms. Pourt. Smitt MCZ # 88. *Cellepora tuberosa.* May 8, [no year]. Cast No. 10, Off Alligator reef, 118 fm. Smitt MCZ # 89. *Cellepora tuberosa.* April 21, 1869. Cast No. 1, Off Key West, 135 fm. Pourt. Smitt MCZ # 141. Bryozoa [*Turbicellepora minutiporosa* and *Micropora acuminata*]. April 21, 1869. Cast No. 1, Off Key West, 135 fms. Smitt MCZ # 144. *Cellepora tuberosa.* May 7, 1869. Off Tennessee reef, Cast No. 9, 174 fms. Smitt MCZ # 175. *Cellepora tuberosa.* May 4, 1868. 9 D[redging] [off Bahia Honda], 119 fms. Holotype. *Cellepora minutiporosa.* USNM Cat. No. 7474, Albatross Stn. No. D. 2662. 29°24'30"N, 79°43' W, 434 fms (off Daytona Beach area).

Description: Colonies form small white nodular encrustations on coral or shell, their surfaces made distinctively bumpy and irregular by the large convex zooids. Zooids are oval to hexagonal in shape at the growing edge, broad and irregular in shape in frontally budded areas (Figs. 273-274). The frontal wall is convex, thickly calcified and relatively smooth in texture, with scattered marginal and frontal pores. A low thick peristome surrounds the the primary orifice (which can only be seen clearly on zooids at the growing edge). This orifice has a smoothly calcified rim, a semicircular anterior portion and a broad shallow U-shaped sinus (Fig. 276). The secondary orifice formed by the peristome opening is irregular in shape due to its rough calcification and to the presence of an oval to bluntly pointed avicularium, embedded at an angle in the proximal-lateral wall (sometimes lacking or replaced by two smaller oval avicularia, one on each side of the orifice). Large interzooidal avicularia with broadly spatulate mandibles and a short cross-bar, are scattered on the surfaces (Fig. 277) as are small, variously directed avicularia, with rounded mandibles and cross-bars . The ovicell is large and irregularly rounded, punctured by numerous (50+) tiny pores, with an opening separate from the maternal zooid operculum. It lies flattened on the colony surface like a partially stuffed pillow (Figs. 273-274).

Discussion: As Smitt noted in his description, the species is common in the Pourtalès collection, being present in 11 of the SMITT MCZ samples, indicating that although no one has recorded it since 1928, it may be a common deep water species, along the southeastern US coast. Canu & Bassler named their specimen from the east coast of Florida *Cellepora minutiporosa*, apparently without realizing that it had been seen by Smitt. Their illustration (pl. 28, fig. 1) clearly shows the species characters, except that they have inked in tiny pores all over zooid frontal surfaces, whereas in reality such pores are only found on ovicell surfaces. Smitt had called the specimens he examined *Cellepora tuberosa*, identifying them with a form of the d'Orbigny fossil species, *Cellepora ramulosa* f. *tuberosa* (= *Reptecelleporaria tuberosa* according to Hayward 1978), based on his studies of European boreal bryozoans. Recent European boreal specimens are now called *Turbicellepora smitti* (Kluge 1962, 1975), and have been studied by Ryland (1963) and Hayward (1978). Smitt's placement of the species was a reasonable one for his time. *T. smitti* is certainly the most similar of the European *Turbicellipora* studied by Hayward (1978) sharing with the Floridan *Buskea minutiporosa* large zooid size, few pores, and a primary orifice shape characterized by a shallow U, rather than a narrow V shaped sinus, as well as a preference for deep water. But *B. minutiporosa* may be distinguished by its very different ovicell (larger relative to zooid size and covered with numerous tiny pores, vs. smaller relative size with few pores), its vicarious avicularia (fat exclamation points, versus light-bulb shapes). The small frontal and peristomial avicularia also appear to be more numerous and varied in shape in *B. minutiporosa*.

Distribution: Florida. Deeper water on hard substrata.

Buskea minutiporosa	Lz	Wz	Lo	Wo	Lov	Wov	Lizav	Wizav	Lfrav	Wfrav
N	18	18	16	16	17	17	18	18	15	15
MEAN mm	0.8	0.65	0.15	0.17	0.44	0.49	0.35	0.18	0.11	0.08
ST DEV mm	0.09	0.09	0.02	0.03	0.07	0.05	0.05	0.03	0.02	0.01
RANGE min	0.63	0.504	0.108	0.144	0.324	0.36	0.252	0.126	0.09	0.054
max	0.99	0.81	0.18	0.216	0.558	0.576	0.45	0.234	0.144	0.09



Figures 273-278. *Buskea minutiporosa*. Smitt MCZ # 144. Fig. 273. Group of frontally budded zooids, showing ovicell and spatulate interzooecial avicularia. Fig. 274. Another group of zooids. Fig. 275. Orifice with peristome and suboral avicularium. Fig. 276. Close-up of primary orifice. Fig. 277. Close-up of an old or injured spatulate avicularium which has regenerated two smaller avicularia. Fig. 278. Close-up of suboral avicularium.

Genus *Turbicellepora* Ryland 1963

Turbicellepora pourtalesi new species
Figs. 279-285 (Smitt MCZ # 60)
Figs. 286-290 (USNM specimen)

Cellepora avicularis Smitt, 1873: 53, pl. IX, figs. 193-198. NOT Cellepora avicularis Hincks, 1860a: 278.
Cellepora dichotoma Osburn, 1914: 214.
Schizmopora dichotoma Canu & Bassler, 1928b: 149, pl. 22, figs. 7-9, text-fig. 34; Maturo, 1957: 73, 58.
Harmerella dichotoma Cheetham & Sandberg, 1964: 1043, fig. 59.

Holotype. *Cellepora avicularis* (=*Buskea pourtalesi*). Inside fishing ground off Cape Fear Riv. Bar 17 fm. No. 86. *Hippothoa biaperta* and *Cellepora avicularis* (= *Pourtalesella incrassata* and *Buskea pourtalesi*).

Other material: Smitt MCZ No. 1. *Cellepora avicularis*. 7D, May 1, 1868 [off Sombrero], 111 fm. Pourt. No. 56. *Hippothoa biaperta* and *Cellepora avicularis* on *Serialaria* sp. (=*Pourtalesella incrassata* and *Turbicellipora pourtalesi* on *Amathia convoluta*). Inside Fishing ground off Cape Fear, Kid Bar 17 fms. Pourt. 1868. No. 60. Off Cape Fear, Bald head Light NNE 14 m 9 fms. Pourt. 1869. No. 161. *Hippothoa biaperta* and *Cellepora avicularis*. Inside fishing ground off Cape Fear Riv. 17 fms. USNM Acc. No. 208837. *Schizmopora dichotoma*. R.C. O. Beaufort, N.C. fishing ground, 10 fm. *Schismopora* (*Cellepora*) *dichotoma* (Hincks). Tortugas, Fla., 10 fath., R. C. Osburn. USNM 7588. Plesiotypes. Schismopora dichotoma, Gulf of Mexico, Alb. Stat. D 2405, 28E45'N, 85E02' W, 30 f.

Etymology: Named in honor of its original collector, Count Louis F. Pourtalès.

Diagnosis: *Turbicellepora* having ovicells with 15-20 pores and a frontal area that remains semi-circular even with increasing calcification.

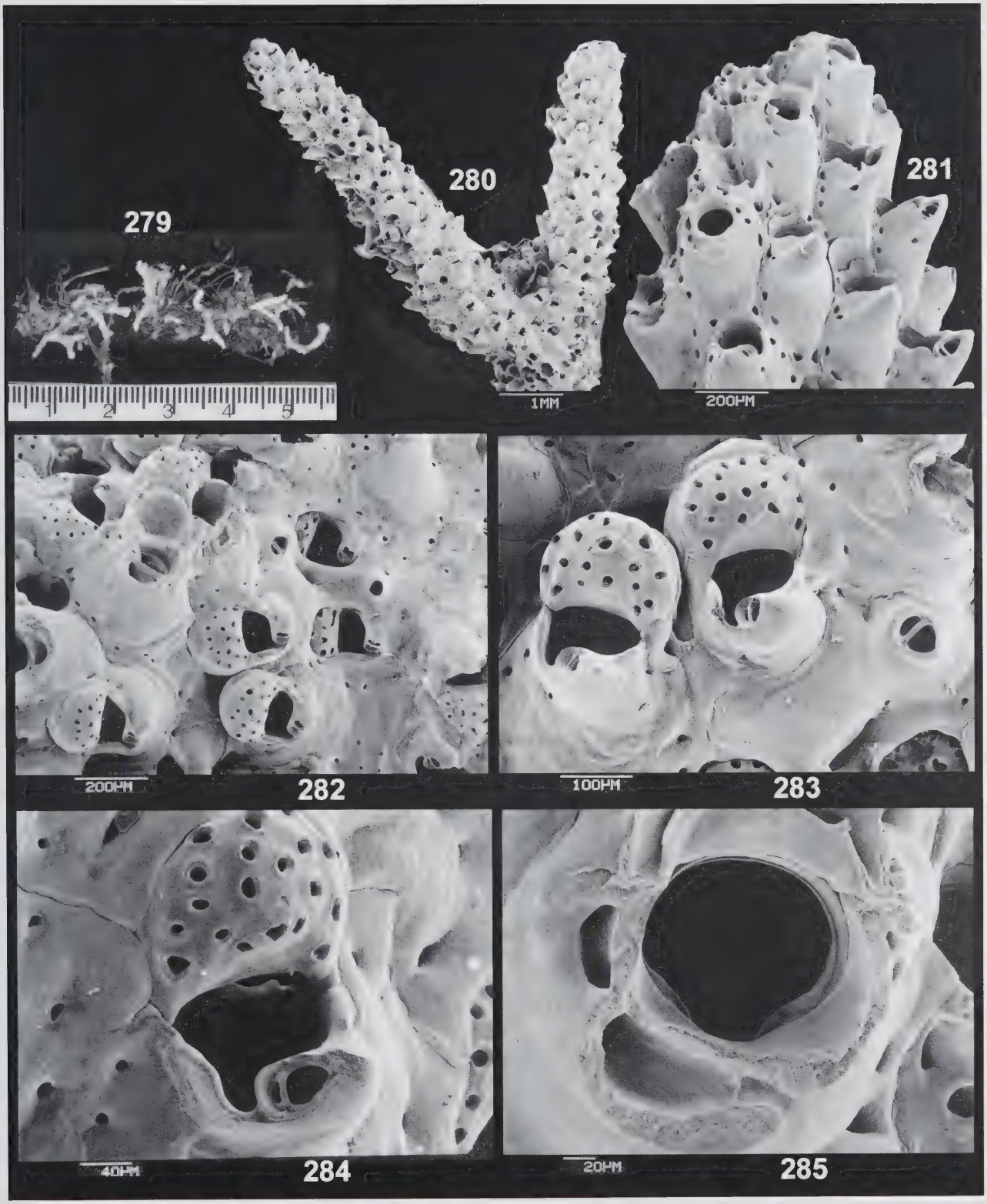
Description: Colonies form nodular to cylindrical encrustations around narrow substrata (e.g. hydroid stems, gorgonians) which may grow free of the substratum and expand into irregular, cylindrical to multilaminar branches (Fig. 279, 280, 286). Zooids are recumbent (at growing edge) to erect, rectangular to ovoid in shape, the frontal wall calcification smooth to slightly granular and perforated only by a few marginal pores. The most conspicuous feature of the frontal wall is the long blunt-pointed mucro which projects diagonally from the zooid surface. The primary orifice is round to transversely oval anteriorly, its margins sloping to a U-shaped proximal sinus (Figs. 285-288). The secondary orifice is irregularly sinuate, the peristome low distally and rising sharply proximally to the pointed mucro. On one side the mucro bears an laterally directed, upwardly slanted avicularium with a triangular mandible and a complete crossbar. Additional adventious bluntly triangular frontal avicularia and rare larger spatulate vicarious avicularia may occur. Ovicells are semicircular with a thickened non-porous rim and a frontal area perforated by about 15-20 pores (Figs. 283-284, 289-290) that may become immersed in secondary calcification, as they age (Fig. 287).

Discussion: This is not the *Cellepora avicularis* (now *Turbicellipora avicularis*) of Hincks (1860). Hayward (1978) has studied the European species of *Turbicellipora*. According to him *T. avicularis* is a cold temperate species with a distribution extending from the Faeroes and Shetland Islands to the western Mediterranean. The Floridan species is much more similar to *Buskea dichotoma* (Hincks 1862), a wide-spread Eastern Atlantic species distributed from the Faroes to the western Mediterranean and Madeira (Hayward & Ryland, 1999: 348) This name has previously been used for Western Atlantic material also by Osburn and others. Figures 279-283 show a USNM specimen from the Beaufort identified by R. C. Osburn.

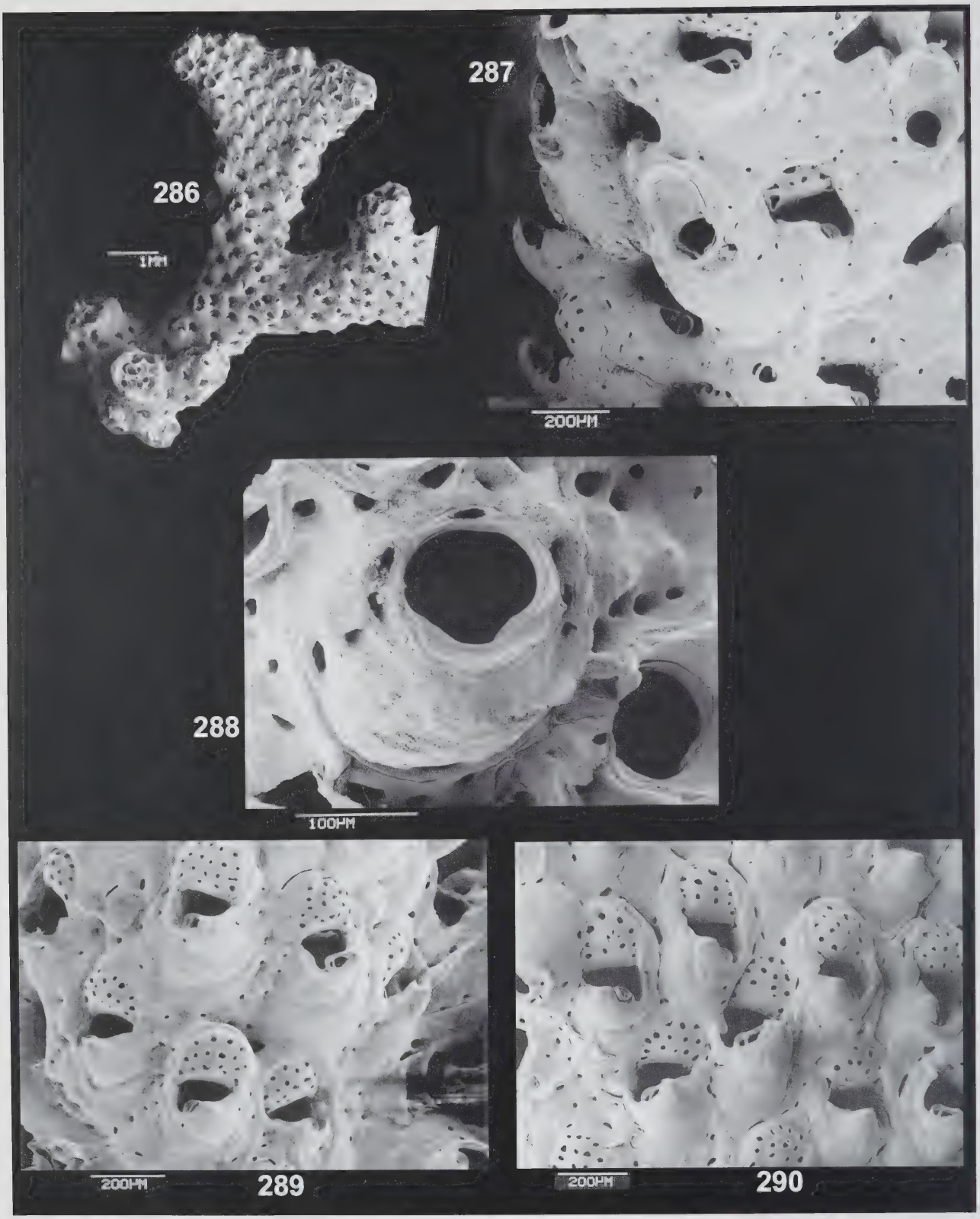
The chief characters distinguishing Western Atlantic populations are the larger number of pores on the ovicells (up to 12 for *dichotoma* vs. 15-20 for *pourtalesi*), the fact that the frontal area of the ovicells becomes covered by secondary calcification only distally and laterally, so that it remains semicircular (vs. increasing proximal calcification in *B. dichotoma* which results in the frontal area being reduced to a small central circular patch, as depicted in Fig. 163C of Hayward & Ryland 1999: 349).

Distribution: Cape Hatteras to Florida, Caribbean, and Gulf of Mexico.

Turbicellepora pourtalesi	Lz	Wz	Lo	Wo	Lov	Wov
N	18	18	18	18	18	18
MEAN mm	0.49	0.28	0.1	0.09	0.14	0.19
ST DEV mm	0.08	0.03	0.01	0.01	0.02	0.02
RANGE min	0.36	0.234	0.072	0.072	0.108	0.144
max	0.63	0.342	0.126	0.126	0.18	0.216



Figures 279-285. *Turbicellepora pourtalesi*. Smitt MCZ # 60, Holotype. Fig. 279. Colony branches life-size. Fig. 280. Portion of a branch fragment. Fig. 281. Zooids at growing tip of colony branch. Fig. 282. Group of ovicelled zooids. Fig. 283. Two ovicelled zooids. Fig. 284. Close-up of ovicell and suboral avicularium. Fig. 285. Close-up of primary orifice.



Figures 286-290. *Turbicellepora pourtalesi* USNM Acc. no. 708837, R. C. Osburn. Fig. 286. Portion of a colony. Fig. 287. Group of zooids with developing ovicells. Fig. 288. Close-up of primary orifice. Fig. 289. Group of ovicelled zooids. Fig. 290. Another group of zooids, showing projecting umbo with avicularium.

Genus *Trematooecia* Osburn, 1940

Trematooecia turrita (Smitt) 1873
Figs. 291-297 (Smitt MCZ #109)

Lepralia turrita Smitt, 1873: 65, pl. XI, figs. 226-228.
Holoporella turrita. Canu & Bassler, 1923: 179, pl. 46, fig. 1; 1928b: 145, text-figs. 33, c, d.
NOT *Trematooecia turrita* (Smitt) Osburn, 1914: 217; 1940: 458 (= *Trematooecia aviculifera*)
Cigclisula turrita Winston, 1982:147, fig. 79.

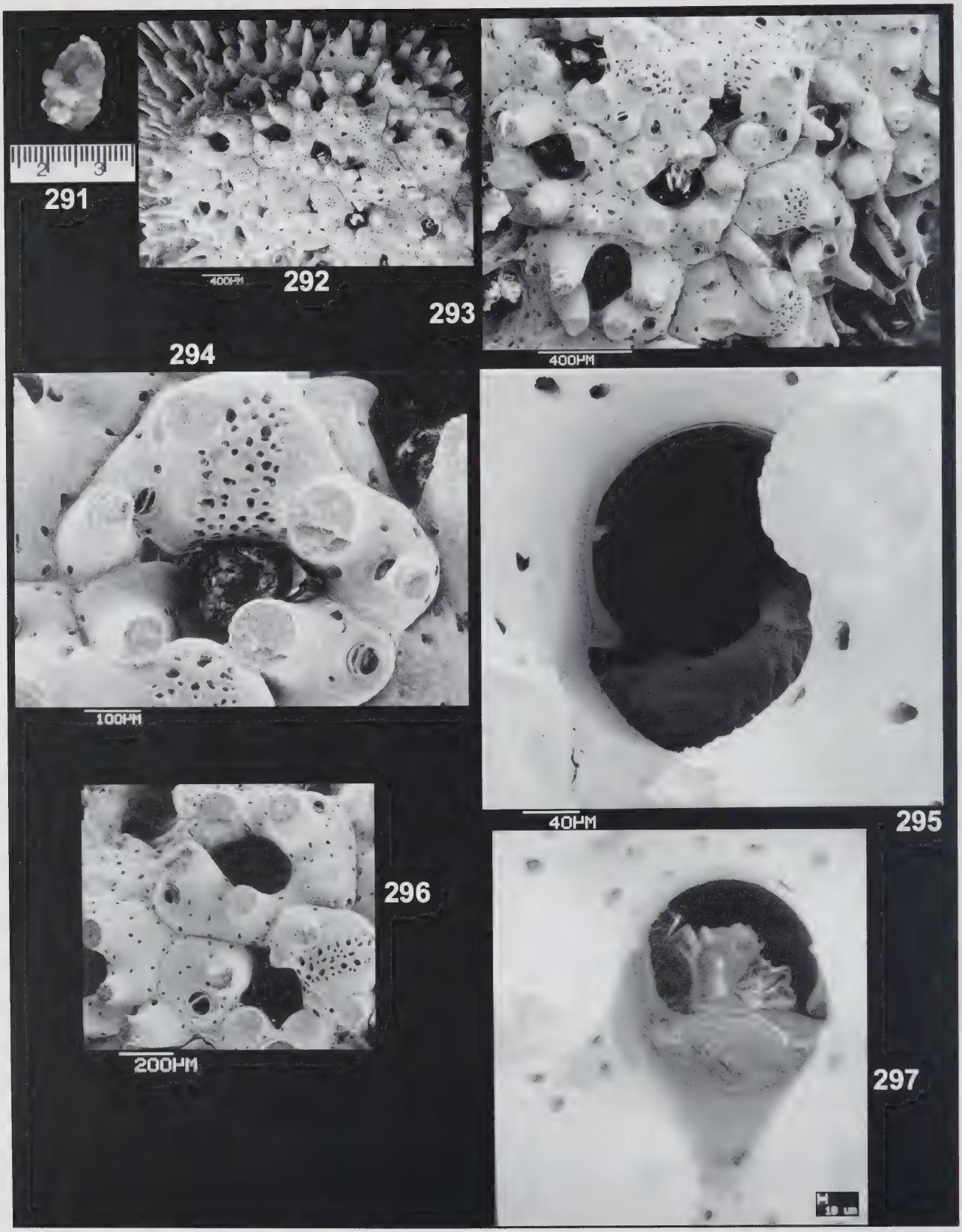
Material Examined: **Syntypes.** Smitt MCZ # 92. *Lepralia turrita*. April 3, 1869, Cast No. 3, Off French reef, 44 fms. Pourt. Smitt MCZ # 109. *Lepralia turrita*. January 16, 1869, Cast No. 9, W. of Tortugas, 37 fms. Pourt. Smitt MCZ # 178. *Lepralia turrita*. May 1, 1868, Cast No. 7, 26 fms. Pourt. USNM 68708. Plesiotype. *Holoporella turrita* Smitt, Pleistocene, Mt. Hope, Panama. VMNH no.

Description: Colonies encrusting, uni-to multilaminar, forming small mounds a few mm in size (e.g., Fig. 291), and pale pink when alive. Zooids erect and deep bodied and have irregularly polygonal borders, with a central orifice surrounded by four or five flat-tipped spine-like tubercles (Figs. 293, 294). The orifice is subcircular proximally and almost circular distally with triangular distolaterally pointing condyles (Fig. 295). Frontal calcification is thick and somewhat granular, with small pores scattered over the surface. Oval adventitious avicularia in two size classes occur on the frontal wall. Smaller ones are usually buried in the peristome calcification, between or at the ends of tubercles; these have serrated distal rostral margins (Fig. 296). The larger avicularia have an enlarged, more spatulate mandible with a smooth rostrum. Ovicells are immersed in the calcification of spines and peristome, open into the peristome and are noticeable mainly as a grid of small pores adjacent to some of the orifices (Fig. 294). Embryos are red.

Discussion: There are still unresolved problems with the genus name *Trematooecia*. When Osburn (1940: 457-8) described the genus he stated that the genotype was *Lepralia turrita* Smitt 1873, but what he called *Trematooecia turrita* in the species description that followed (p.458-9) and the orifice he illustrated in his only illustration of the species (pl. 8, fig. 72) was actually *Trematooecia aviculifera*, the *Holoporella aviculifera* of Canu & Bassler (1923: 179, pl. 46, fig. 2), a species which they described from the Pleistocene of Mount Hope, Canal Zone, Panama. *Trematooecia*-like forms have a long history in the Caribbean-western Atlantic, and have undergone some radiation there. Specimens from Florida have numerous very small pores in the porous region of the ovicells, as do specimens from Venezuela. Specimens from Belize (Winston, 1984: 32, figs. 67, 68) have a smaller number of large pores on ovicells, and some zooids have more than 5 tubercles around the orifice. Specimens from the Caribbean coast of Costa Rica (Banta & Carson, 1977: fig. 4E) are more similar to those from Belize, with larger ovicell pores and a greater number of tubercles, than to Smitt's material from Florida. The species has also been reported from the eastern Pacific by Hastings & Powell. Several species besides *turrita* have been described (*aviculifera, protecta, hexaogonalis*, and see the NMITA website), but a thorough redescription and review is needed.

Distribution: Georgia, Florida, Gulf of Mexico, Caribbean. Also reported from Pacific localities.

Trematooecia turrita	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	18	18	18	18	11	11	9	9
MEAN mm	0.59	0.5	0.19	0.17	0.28	0.37	0.06	0.05
ST DEV mm	0.1	0.09	0.02	0.02	0.02	0.04	0.01	0.02
RANGE min	0.414	0.396	0.162	0.126	0.234	0.324	0.045	0.036
max	0.81	0.666	0.216	0.198	0.324	0.432	0.081	0.072



Figures 291-297. *Trematooecia turrita*. Fig. 291. Three life size nodular colonies Smitt MCX # 92. . Fig. 292. Group of zooids showing thick, spine-like perstomial tubercles. . Smitt MCZ # 109. Fig. 293. Group of zooids. Fig. 294. Close-up of ovicell and avicularia on tubercles. Fig. 295. Close-up of orifice (partially blocked by tubercle and debris, ut one condyle is visible on left). Fig. 296. Group of zooids near growing edge of colony. Fig. 297.Another orifice close-up.

Trematooecia aviculifera (Canu & Bassler) 1923
Figs. 298-303 (Smitt MCZ # 121, 181)

Holoporella aviculifera Canu & Bassler, 1923: 179, pl. 46, fig. 2.
Holoporella turrita (Smitt) Osburn, 1914: 217; 1927: 131.
Trematooecia turrita (Smitt) Osburn, 1940: 458.
Tremotooecia aviculifera Powell, 1971: 773; Winston, 1984: 31, figs. 65, 66.

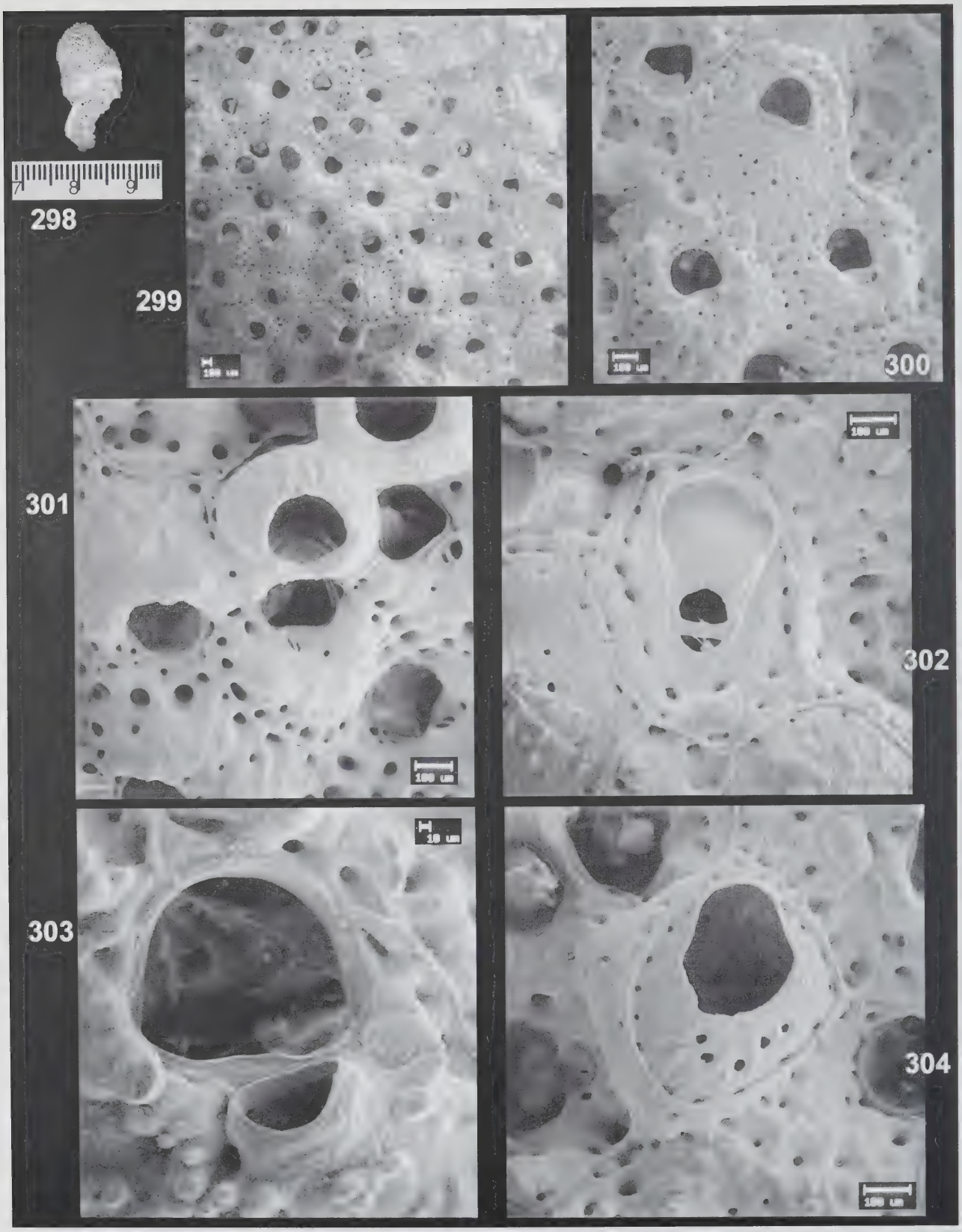
Material examined: Smitt MCZ # 121. *Discopora albirostris* [with *Trematooecia aviculifera, Cribellopora constellata, Microporella* sp. and *Puellina smitti*, none identified by Smitt]. [No date given –Jan. 1869?] Tortugas. Smitt MCZ # 181. *Discopora albirostris* [= *Trematooecia aviculifera*] Jan. 16, 1869. Cast No. 9, W. of Tortugas, 37 fm. NMNH. USNM 68709. Holotype. *Holoporella aviculifera.* Canu & Bassler, 1923: pl. 46, fig. 2. Pleistocene, Panama Canal Zone. No no. *Trematooecia aviculifera.* St. George's Cay, British Honduras. Acc. No. 32631. *Trematooecia aviculifera.* Mangrove roots, Fisherman's Cay, Belize. *Trematooecia aviculifera.* Isla Grande and San Blas, Panama. Acc. 300990. *Trematoeocia.* Belize, Carrie Bow Cay, fore reef slope. CBC-14.5.75-1 14-38 m. B. Spracklin, Coll. 14 May 1975. *Trematooecia aviculifera*, unknown loc. On Curaçao, D. L. Meyer. *Trematooecia turrita* (Smitt) Tortugas, FL, 15 fm. R. C. Osburn, 1908. *Trematooecia turrita* (Smitt) Jan Thiel baai -70' (coral living calice up) Curaçao. 9-8-69 D. L. Meyer. Acc. No. 208837. *Trematooecia protecta*, off Guanica Harbor, Porto Rico, 18 fath., R. C. Osburn, 1915.

Description: Colonies encrusting, often multilaminar and forming large mounds or patches several cm across. Color when living brick red (but below about 7 meters underwater appearing fluorescent lime green). Skeleton pink colored also. Zooids of initial layer rectangular, those of frontally budded layers irregularly polygonal (Fig. 300). Frontal wall heavily calcified with scattered pores, mostly near center or at zooid margins. Surface raised into mounds or tubercles, especially in the vicinity of the orifice (Figs. 299-300). Orifice semicircular. A small suboral, oval, laterally directed avicularium is present on most zooids (Fig. 301). Interzooidal avicularia with large oval to spatulate mandibles may occur between zooids (Fig. 302). Orifices round, with thick granular walls, partially embedded in frontal surface calcification, but with circular to oval frontal membranous area, which may calcify over with age (Fig. 301).

Discussion: Smitt did not recognize *Trematooecia aviculifera;* he identified it as *Celleporaria albirostris.* The problems with the names of this species and *Trematooecia turrita* have been discussed under *turrita. Trematooecia aviculifera* is one of the most abundant bryozoans on Caribbean coral reefs, and, because it can compete with corals and sponges for space on open vertical surfaces, it is one of the most likely to be noticed by divers. The orifice (without condyles) and ovicell (with its single pore, rather than series of pores) are quite different than those of the *turrita* group, and *Trematooecia aviculifera* and *Trematooecia protecta* – which has an ovicell with a single membranous area (but in which the front of the ovicell is tilted forward, rather than lying parallel to the zooid surface) may require a new genus.

Distribution: Florida, Caribbean.

Trematooecia aviculifera	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	12	12	12	12	6	6	12	12
MEAN mm	0.71	0.59	0.17	0.19	0.37	0.52	0.12	0.09
ST DEV mm	0.06	0.07	0.01	0.01	0.02	0.02	0.02	0.02
RANGE min	0.63	0.468	0.162	0.18	0.342	0.504	0.09	0.072
max	0.81	0.72	0.18	0.198	0.414	0.54	0.162	0.126



Figures 298-304. *Trematooecia aviculifera.* Fig. 298. Entire nodular colony. Life-size. Smitt MCZ # 181. Fig. 299. Irregular, frontally budded colony surface. Smitt MCZ.# 121. Fig.300. Group of zooids. Smitt MCZ.# 121. Fig.301. Ovicelled zooid. Smitt MCZ.# 181. Fig. 302. Spatulate avicularium. Smitt MCZ.# 121. Fig. 303. Close-up of orifice. Smitt MCZ.# 121. Fig. 304. Frontally budded zooid with developing frontal wall. Smitt MCZ.# 121.

Family Hippoporidridae Vigneaux, 1949

Genus *Hippotrema* Canu & Bassler, 1927

Amended Diagnosis: Colony encrusting to mound-like or branching, frontal wall with rugose calcification, centrally imperforate, but with small marginal pores proximally. Orifice, large, rounded distally, with small condyles and a very broad and shallow sinus. Asymmetrically placed adventitious avicularia may be present. Ovicell hyperstomial, not closed by operculum, with a membranous slit or less calcified frontal area.

Type Species: Lepralia janthina Smitt, 1873.

Hippotrema janthina (Smitt), 1873
Figs. 305-309 (Smitt MCZ #63)

Lepralia edax forma *janthina* Smitt, 1873: 63, pl. XI, figs. 224, 225.
Lepralia janthina Osburn, 1914: 213.
Hippotrema janthina Canu & Bassler, 1928b: 141.
Hippoporidra janthina Cheetham & Sandberg, 1964: 1033, text-fig. 36.

Material Examined: Smitt MCZ # 63. *Lepralia janthina* [and] *Discopora albirostris*. 1868 [no day or month] 3d D[redging], SW of Loggerhead [Key], 9 fms. Pourt. (young colony on large calcareous nodule mostly made up of layers of dead bryozoan colonies). Apparently not type material, as Smitt states that his forma *janthina* is from 13 fms.).

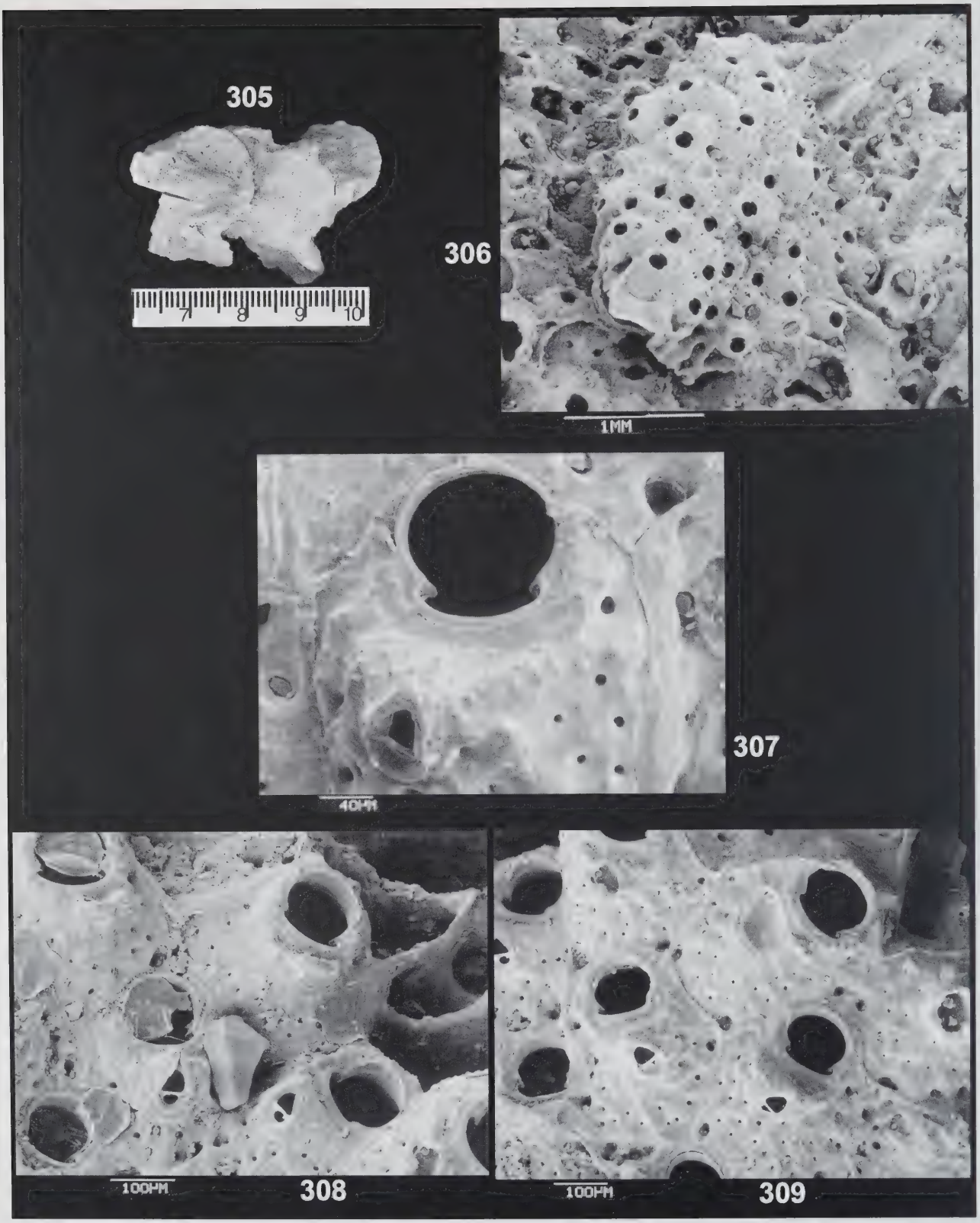
Description: Colony is encrusting, becoming nodular or branching, deep purple or blue-black in color according to Osburn, the dried MCZ specimen has no color. Zooids are convex, rhomboidal, those at the growing edge recumbent, inner zooids more erect (Fig. 306). Frontal calcification is thick and rugose, becoming ridged near margins, perforated by a few large marginal pores, and except around the orifice and suboral umbo, by a number of small frontal pores as well. The orifice is hoof-shaped and large relative to zooid size, with a circular anterior portion, two small, sharp, proximally-directed condyles, and a very broad and shallow sinus (Fig. 307). Below the orifice is a rough-textured umbo, supporting a sharp pointed triangular avicularium with a complete cross-bar. The avicularium and rostrum are not quite centered on the frontal surface, and the avicularium is directed distally and slightly laterally, so the effect is asymmetrical (Figs. 307-309). No ovicells were present in the one very small specimen in the MCZ collection. According to Cheetham & Sandberg (1964) they are globose, with coarsely granular calcification and a large, less calcified frontal area.

Discussion: As has been pointed out by Cook (1964b: 21; 1985: 175) Canu & Bassler's original description of the genus (1927: 9) gave *H. janthina* as the genotype species, but also included *Cleidochasma rotundorum* (Norman 1909), stating that "This is the *Cellepora janthina* group of Waters of which we have published a text-figure." (Canu & Bassler, 1920: 615, fig. 185). The text-figure shows both *H. janthina* and *Cellepora rotundora*. Since Canu & Bassler did make *H. janthina* the genotype there seems no problem with the genus name, although the question remains as to what other species, including *C. rotundorum*, might also be included. *Cleidochasma rotundorum* is a rare species found from Madeira to Angola, but characteristic of small substrata in deeper water (Cook, 1985: 173). Cook's SEM, pl. 19B, shows zooids with a rough textured frontal surface, with small pores proximally, as well as orifices that are large relative to zooid size, and very similar in shape to those of *H. janthina*; it is possible that the two species are closely related. There may be additional species that could be placed in *Hippotrema*, see for example, "*Characodoma*" *latisinuatum* (Harmer), 1957: figs. 18, 19 of Cook & Bock, 1997.

Over the years this species has also been confused with Western Atlantic *Hippoporidra* species, for example, *Hippoporidra janthina* (Maturo, 1957: 53, fig. 59) shows a *Hippoporidra*. As Cook (1985: 175) pointed out *Hippotrema janthina* differs from *Hippoporidra* species in its lack of males, zooids, integrated groups of zooids, in the relationships of adventious avicularia, and frontal wall calcification.

Distribution: Florida, Caribbean, Gulf of Mexico.

Hippotrema janthina	Lz	Wz	Lo	Wo	Lav	Wav
N	6	6	6	6	6	6
MEAN mm	0.44	0.29	0.13	0.12	0.07	0.06
ST DEV mm	0.03	0.01	0.01	0.01	0.01	—
RANGE min	0.42	0.28	0.12	0.1	0.06	0.06
max	0.48	0.3	0.14	0.12	0.08	0.06



Figures 305-309. *Hippotrema janthina.* Smitt MCZ #63. Fig. 305. Life-sized encrusting colony. Fig. 306. Close up of *Hippotrema* colony encrusting dead bryozoan colony. Fig. 307. Orifice and avicularium. Fig. 308. Group of zooids, shoiwng position of avicularia. Fig. 309. Another group of zooids.

Genus *Hippoporella* Canu, 1917

Hippoporella pusilla (Smitt), 1873
Figs. 310-314 (Smitt MCZ # 149)

Discopora albirostris forma *pusilla* Smitt, 1873: 70, pl. XII, fig. 233 (In Part)
NOT *Holoporella pusilla* Osburn, 1914: 215 (= a *Celleporaria* sp.).
Aimulosia pusilla Winston & Håkansson, 1986: 36, figs. 86-89.

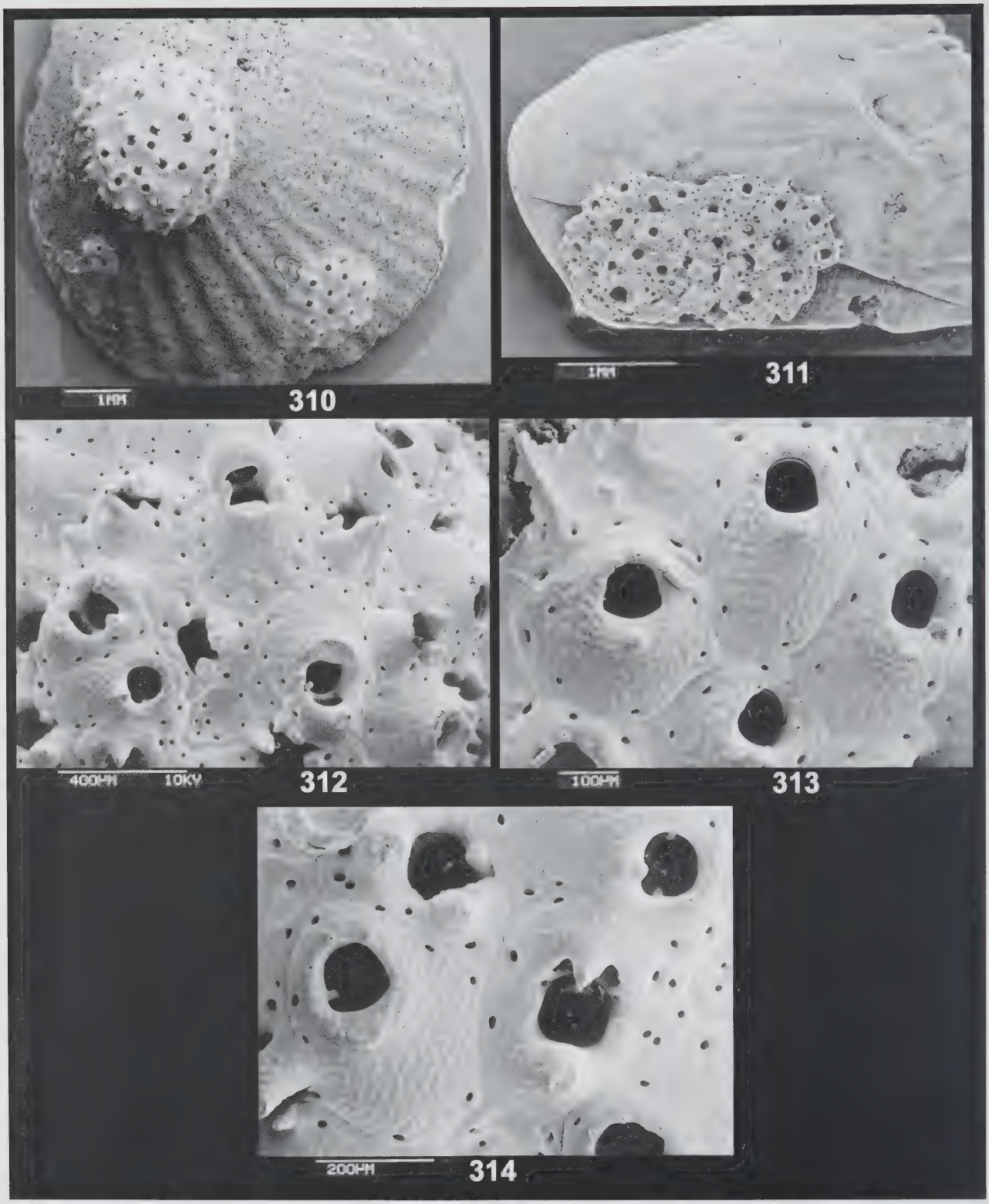
Material Examined: Syntype. Smitt MCZ no. 149. *Discopora pusilla erecta.* May 11, 1869. Off Conch Reef, Cast NO. 4, 60 fms. [also labeled on underside of container, *Discopora pusilla* incrustans et erecta]. NMNH. Acc. No. 208837. Osburn Collection. *Holoporella pusilla* (Smitt). RCO. Dry Tortugas, Florida. VMNH. No. 2942.00 Avalon beach, N. Hutchinson Island, St.Lucie Co., FL., J. E. Winston 15 July 2002.

Description: Colony encrusting, white in color, forming very small flat spots or frontally budded mounds on calcareous substrata (Fig. 310). Zooids oval to subhexagonal, also small in size, with a convex surface raised to a thick suboral umbo having one or more (usually broken) points. The imperforate pebbly to granular textured frontal calcification is edged by a row of small marginal pores (Figs. 312-313). Orifice large relative to zooid size, bell-shaped, wider at its down-curved proximal rim, with two large distinct condyles (Fig. 314). Distal part of the orifice bordered by 4 or 5 small hollow spines (one centered), often broken and/or obscured by secondary calcification. Ovicells with marginal pores and covered with calcification matching that of zooids. The front of the ovicell may rise to a projecting pointed tubercle (Fig. 314). In addition to the suboral tubercle, ovicelled zooids may have additional stout tubercles located adjacent to the orifice and ovicell opening (Fig. 312).

Discussion: This tiny species presents a problem. The specimens from Smitt MCZ no. 149 (Figs. 310-314) are clearly the material from 60 fms mentioned by Smitt, p. 70, "*. . . coloniam erectam testae mortuae insidentem in profunditate 60 orgyarum invenit.*" As Fig. 310 shows there is a very small encrusting and a larger, sexually mature erect colony on this small dead scallop shell. Smitt's fig. 233b shows what looks like the orifice of this species. However, the zooids shown in his fig. 233 have up to 6 spines, and some have avicularia on the suboral umbo, while fig. 233a shows an orifice that is broader than high, not bell-shaped, and which also has six spines. Smitt may have had two entities here, one of which could have a been a *Celleporaria* (The NMNH specimen described as *Holoporella pusilla* (Smitt) in Osburn's 1914 Tortugas paper (p. 215) is actually a *Celleporaria*, probably *C. albirostris*, of which Smitt considered *pusilla* a variety. Or Smitt may have had another *Hippoporella* species in his samples (he says he had material collected by Pourtalès from 9 and 60 fm). *Hippoporella uvulifera*, described by Osburn from the Tortugas in the same 1914 paper (p. 210, figs. 19, 20) has 6 oral spines and a broader orifice than *pusilla* (see Winston & Håkansson, 1986: 36, figs. 90-92). According to Osburn, *Hippoporella uvulifera* may have avicularia near the orifice (as in Smitt's figs. 233, 233a), although none were present on the sand grain specimens of Winston & Håkansson.

Distribution: Florida. Common subtidally on dead shell material on the Indian River area coast of Florida.

Hippoporella pusilla	Lz	Wz	Lo	Wo	Lov	Wov
N	6	6	6	6	6	6
MEAN mm	0.46	0.36	0.12	0.12	0.14	0.23
ST DEV mm	0.04	0.07	0.01	0	0.01	0.01
RANGE min	0.414	0.234	0.108	0.117	0.126	0.216
max	0.522	0.45	0.135	0.126	0.144	0.252



Figures 310-314. *Hippoporella pusilla*. Smitt MCZ #149. Fig. 310. Two nodular colonies encrusting dead bivalve shell. Fig. 311. Close-up of growing edge of colony. Fig. 312. Group of zooids, including two with ovicells. Fig. 313. Group of zooids, showing orifice shape. Fig. 314 .Close-up of ovicelled zooid,showing ovicell projection.

Family Phidoloporidae Gabb & Horn, 1862

Genus *Stephanollona* Duvergier, 1920

Stephanollona asper (Canu & Bassler), 1923 new combination
Figs. 315-320 (Smitt MCZ # 94)

Hippothoa biaperta Smitt, 1873: 46 (In part), pl. VIII, fig. 173. NOT *Eschara biaperta* Michelin, 1841-2: 330.
Perigastrella (Lepralia) contracta Canu & Bassler, 1920: 576. NOT *Lepralia contracta* Waters, 1899: 11.
Perigastrella contracta Marcus, 1937: 98, pl. XX, fig. 52.
Gemellipora asper Canu & Bassler, 1923: 110, pl. 18, figs. 5, 6; 1928b: 90, pl. 10, fig. 1.
Cleidochasma contracta Lagaaij, 1963: 189, pl. V, fig. 2.

Material Examined: Smitt MCZ # 11. *Hippothoa biaperta.* January 18, 1869. Cast No. 3, S. W. of Tortugas, 60 fms. Pourt. (With *Pourtalesella incrassata* and *Stephanollona serrata*) [col. No. 1 measured]. Smitt MCZ # 94. *Hippothoa biaperta.* January 18, 1869. Cast No. 3, S. W. of Tortugas, 60 fms. Pourt. [col. no. 2 measured]. Smitt MCZ # 110. *Hippothoa biaperta.* January 16, 1869. Cast No. 12, W. of Tortugas, 42 fms. Pourt. [col. no. 3 measured]. VMNH no.2963.00 off Pepper Park, Fort Pieres, St. Lucie Co., FL., J. E. Winston & M & D Littler 20 July 2002.

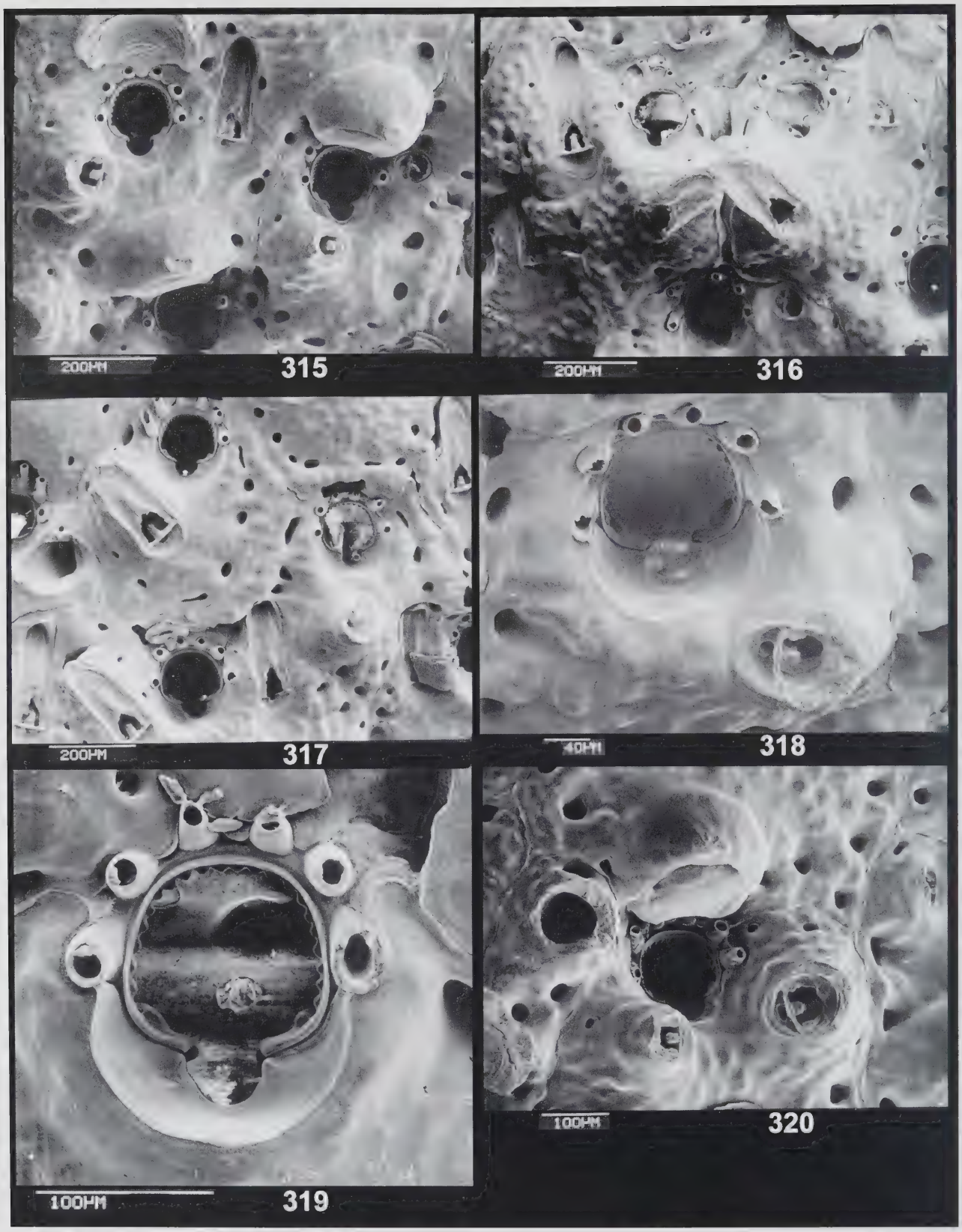
Description: Colonies whitish in color, one to many layers, colonies often have a rough texture due to many large avicularia. Zooids oval to irregularly polygonal; frontal wall with a bumpy granular surface, imperforate except for a row of marginal pores. Six hollow spines surround the distal portion of the orifice which sits in a sunken "collar" of smooth calcification. Hoof-shaped distal portion of orifice with a beaded rim that extends down to the two large rounded condyles that mark the opening of the deep U-shaped proximal sinus (Figs. 318, 319). Small avicularia when present raised at an angle on prominent umbones, oriented in various directions from distolateral to proximolateral. They have complete cross-bars, a large columella and rough edged rostrum. Large spatulate avicularia, almost straight-sided, with rounded to blunt-pointed rostra, and cross-bars with a long thick columella, may also be present. They are raised somewhat above frontal surfaces of zooids and usually distolaterally directed (Figs. 314, 315). Ovicells are prominent, with a rough textured outer surface and a smooth thinner semi-circular frontal area (Figs. 315, 320). They open above the zooid operculum.

Discussion: As mentioned under *Schedocleidochasma cleidostomum*, Smitt did not recognize this species, but lumped it, the following species, and *Pourtalesella incrassata* all together as "*Hippothoa biaperta*". In recent years, Western Atlantic material of this and the following species were both called "*Cleidochasma contractum*". It is now recognized that "*Cleidochasma contractum*" also represents a widely distributed species complex. This species complex has also been recognized as being more closely related to phidoloporid genera like *Rhynchozoon* (based on beaded orifice, and ovicell characters), and its species are currently placed in the genus *Stephanollona* Duvergier 1920 (Gordon 1994, Cook and Bock 1996). There are existing species names in the literature for both this species and the following species based on Western Atlantic material. It seems best that those names be recognized and used, at least until their genetic relationship with relatives from other areas can be worked out.

Canu & Bassler did not mention the number of spines in their original description of the species, but the occurrence of six oral spines is in contrast to the four spines of the next species (*Stephanollona serrata*), and is the easiest way to distinguish the two when they co-occur. *S. asper* can also be distinguished from *S. serrata* by the following characters: 1) the very large spatulate avicularia with the very long columella of the trifoliate palate, 2) the deeper and narrower orificial sinus, 3) the completely calcified half-moon shaped frontal area of the ovicell, 4) the roughened, but not serrate edges of the small avicularia, and 5) the presence of a long columella on the small avicularia also.

Distribution: ? Cape Hatteras to Florida, Caribbean, Gulf of Mexico, Brazil.

Stephanollona asper	Lz	Wz	Lo	Wo	Lov	Wov	Lav small	Wav small	Lav large	Wav large
N	18	18	18	18	12	12	18	18	18	18
MEAN mm	0.45	0.41	0.11	0.09	0.21	0.27	0.09	0.07	0.27	0.08
ST DEV mm	0.08	0.09	0.02	0.01	0.03	0.04	0.01	0.01	0.05	0.02
RANGE min	0.324	0.288	0.09	0.072	0.162	0.234	0.054	0.054	0.216	0.054
max	0.576	0.63	0.144	0.108	0.252	0.324	0.108	0.09	0.432	0.108



Figures 315-320. *Stephanollona asper.* Smitt MCZ # 94. Fig. 315. Two zooids, showing ovicells and small and large avicularia. Fig. 316. Zooids with large avicularia. Fig. 317. Three zooids, showing avicularia and 6 oral spines. Fig. 318. Close-up of orifice and small avicularium. Fig. 319. Closeup of another orifice. Fig. 320. Close-up of ovicell and avicularia.

Stephanollona serrata (Osburn) 1912
new combination
Figs. 321-326 (Smitt MCZ no. 5, 11)

Hippothoa biaperta Smitt, 1873: 46 (In part), pl. VIII, probably fig. 174. NOT *Eschara biaperta* Michelin, 1841-2: 330.
Lepralia serrata Osburn, 1912: 242, pl. 26, fig. 57, 57a, 57b, 57c.
Lepralia contracta var. serrata Osburn, 1914: 211.
Hippoporina contracta Osburn, 1940: 428 (in part?); Maturo, 1968: 52 (in part?). NOT *Lepralia contracta* Waters, 1899: 11.
Cleidochasma contractum Cheetham & Sandberg, 1963: 1032, text-fig. 38; Winston, 1982: 148, fig. 81.

Material Examined: Smitt MCZ #5. *Hippothoa biaperta.* May 1, 1868, Cast No. 7 [off Sombrero Key], 26 fms. Pourt. [col. no. 1 measured]. Smitt MCZ #11. *Hippothoa biaperta* (two colonies, S. asper colony also present). January 18, 1869, Cast No. 3, S.W. of Tortugas, 60 fms. Pourt. [col. no. 2 measured]. Smitt MCZ #118. *Hippothoa biaperta.* January 16, 1869, Cast No. 12, W. of Tortugas, 60 fms. Pourt. [col. no. 3 measured]. VMNH no. 2975.00 North Beach, Fort Pierce, St. Lucie Co., FL., J. E. Winston 4 July 2002.

Description: Colony encrusting, unilaminar to multilaminar, whitish in color, in young colonies surface glassy and shining. Zooids oval to polygonal in shape, with thick rough-textured calcification, and a row of large marginal pores. The orifice is set in a collar of smooth calcification, with four hollow spines surrounding its distal edge. Orifice hoof-shaped distally, with a beaded edge, on its lower rim, two downward facing condyles set off the U-shaped sinus (Figs. 325, 326). Avicularia in various sizes, oval to spatulate in shape, oriented in various directions and raised at an angle on umbones. They have complete crossbars, and serrated edges to their rostra (Fig. 326). Ovicells are hyperstomial, broader than long, with a heavily calcified outer portion and an oval, to half-moon shaped less calcified area. Their narrow transverse opening is not closed by the zooid operculum (Figs. 323, 324).

Discussion: Smitt did not recognize this species, but combined its colonies with those of *S. asper* and *P. incrassata* under *Hippothoa biaperta.* It was first recognized by Osburn (1912) from the Woods Hole, area, who gave an accurate description with illustrations. However, in his later work, Osburn synonymized the species with Waters' Madeiran "*Lepralia contractum* (*Stephanollona contracta*) probably because he found specimens in other areas that had a larger number of spines, and some very large avicularia (= *Stephanollona asper* and others). The orifice and avicularian characters that distinguish the species in this group are not clear without SEM study.

Distribution: Massachusetts to Florida, Gulf of Mexico.

Stephanollona serrata	Lz	Wz	Lo	Wo	Lov	Wov	Lav small	Wav small
N	18	18	18	18	15	15	18	18
MEAN mm	0.39	0.38	0.12	0.11	0.2	0.25	0.06	0.05
ST DEV mm	0.05	0.04	0.01	0.01	0.03	0.02	0.01	0.01
RANGE min	0.306	0.288	0.099	0.09	0.126	0.216	0.036	0.036
max	0.486	0.45	0.144	0.126	0.234	0.288	0.09	0.072

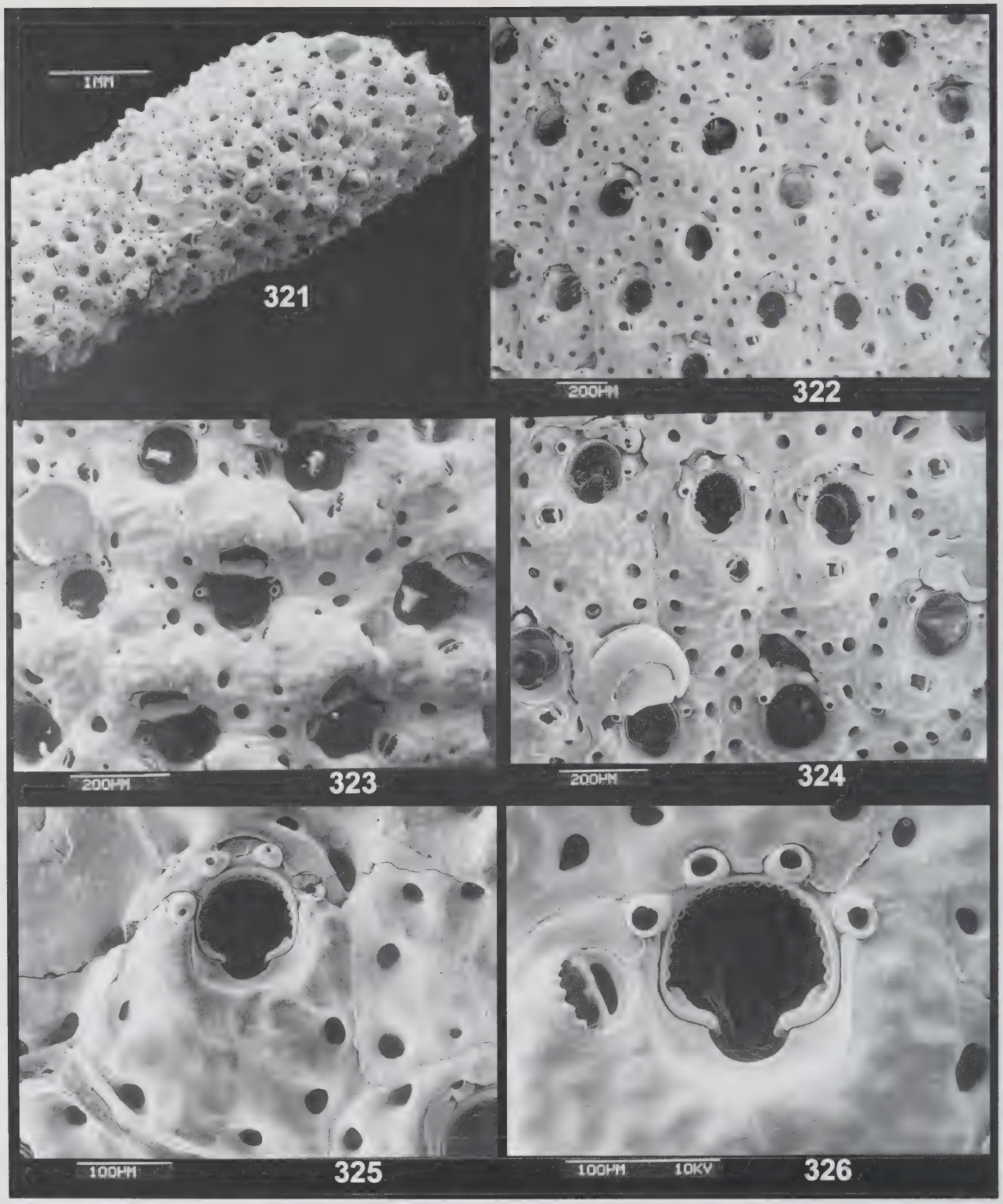
Genus *Reteporellina* Harmer 1933

Reteporellina marsupiata (Smitt) 1873
Figs. 327-335 (Smitt MCZ #124)

Retepora marsupiata Smitt, 1873: 67, pl. XIII, figs. 245-248, 251-254.
Retepora marsupiata Osburn, 1914: 200; Canu & Bassler, 1928b: 122, figs. 7-13, text-fig. 23A.
Reteporellina marsupiata Osburn, 1940: 441; Rucker, 1967: 831, fig. 15, f, g.

Material Examined: All part of Syntype. MCZ #113. *Retepora cellulosa marsupiata* January 22, 1869. Cast No. 3, S. of Rebecca Channel 16 ½ fms. Pourt. MCZ # 124. *Retepora cellulosa marsupiata.* January 22, 1869. Cast No. 3, S. of Rebecca Channel 16 ½ fms. Pourt. MCZ # 174. *Retepora marsupiata* January 22, 1869. Cast No. 3, S. of Rebecca Channel 16 ½ fms. Pourt.

Description: Colony consisting of erect, rigid, sparsely reticulate fan-shaped branches (Fig. 327) which according to Osburn (1914) are pale pink in life. Zooids in four to eight longitudinal series, widest just below branch bifurcations (Fig. 328). Zooids rhomboidal, with smoothly calcified frontal walls showing only a few small marginal pores, and delimited by raised suture lines. According to Osburn (1940) the primary orifice is nearly semi-circular and slightly beaded anteriorly. Budding zooids almost immediately develop a long tubular tripartite peristome with a central sinus, making the peristome opening thus appear mushroom shaped from above (Fig. 330). Some zooids bear large, projecting avicularia, with blunt-tipped, or bifid hooked rostra (Figs. 332-334). Zooids bearing these avicularia have one or two additional pores near the base of the avicularium. Abfrontal colony surface marked by raised sutures, as well as projecting avicularia with triangular mandibles located on branch margins and in the forks of branch bifurcations (Figs. 329, 335). Ovicell helmet shaped with a narrow median fissure and a short labellum with shallow side slits (Fig. 333).



Figures. 321-326. *Stephanollona serrata.* Fig. 321. Colony encrusting hollow tube. Smitt MCZ # 5. Fig. 322. Group of zooids. Smitt MCZ # 11. Fig. 323. Group of ovicelled zooids. Smitt MCZ # 5. Fig. 324. Group of zooids, showing beaded rims of orifices, 4 orificial spines, avicularia, and an ovicell. Smitt MCZ # 11. Fig. 325. Close-up of orifice, showing beaded rim and four spines. Smitt MCZ # 5. Fig. 326. Another orifice and avicularium, note serrated edge of avicularian rostrum. Smitt MCZ # 5.

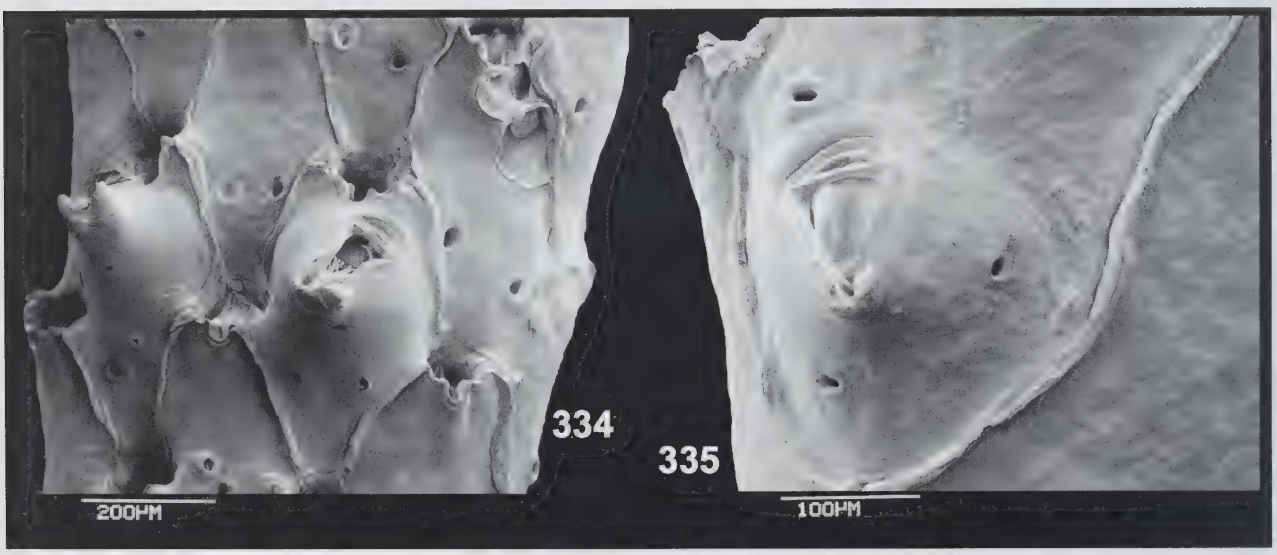
Figures 327-334. *Reteporellina marsupiata.* Smitt MCZ #124. Syntype. 327. Colony branch fragments, life-sized. Fig. 328. Portion of frontal face of branch to show zooids and branching pattern. Fig. 329. Abfrontal surface of branch. Fig. 330. Developing zooids at growing tip of branch, to show primary orifice.. Fig. 331. Zooids at growing tip. Fig. 332. Group of zooids with developing ovicells. Fig. 333. Group of ovicelled zooids with large interzooecial avicularia. Fig. 334. Close-up of ovicell and avicularium.

Discussion: The species is very similar to *Reteporellina evelinae* (Marcus 1955). However, in that species, the colony is semi-erect, with radially arranged branches that bifurcate, but do not anastomose. The peristomes of *Reteporellina evelinae* are more elaborate than those of *marsupiata*, being tipped by several jagged projections of calcification, and the labellum of the ovicell is longer, with deep slits on either side (Marcus, 1955: fig. 67). Although Smitt listed *Retepora marsupiata* as occurring from 16-262 fms. in depth, all three of the lots in the MCZ collection are from one station at 16 ½ fms (S. of Rebecca Channel). The other Smitt MCZ specimen he labelled "*Retepora marsupiata*" (from 242 fms, off Sombrero) is actually *Schizellozoon elongatum* (next description).

Smitt said he used Busk's ms. name for specimens from Teneriffe, but when Busk published (1884, p.116) he called that species *Retepora atlantica*. *Retepora atlantica* differs in that the peristome is not channeled on its innner surface and does not have the small median 'sinus' of *R. marsupiata*. Instead, it has a short median fissure with a small proximal labial pore, a small avicularium on one side of the fissure, a pair of quite prominent lateral oral spines and a peristome rim produced laterally into short processes.

Distribution: (Georgia shelf (Maturo 1968, as *Sertella marsupiata*) to Florida, Caribbean and Gulf of Mexico, subtidal to continental shelf depths.

Reteporellina marsupiata	Lz	Wz	Lo	Wo	Lov	Wov	Lav	Wav
N	12	12	6	6	6	6	6	6
MEAN mm	0.51	0.21	0.12	0.12	0.19	0.16	0.15	0.07
ST DEV mm	0.05	0.02	0.01	0.01	0.01	0.01	0.02	0.01
RANGE min	0.45	0.18	0.108	0.108	0.162	0.153	0.126	0.054
max	0.576	0.234	0.126	0.144	0.198	0.18	0.18	0.072



Figures 335-336 *Reteporellina marsupiata* Smitt MCZ # Fig. 335. Close-up of zooids with projecting frontal avicularia with bifid points on rostra. Fig. 336. An abfrontal surface avicularium

Genus *Schizellozoon* Canu & Bassler, 1917

Schizellozoon elongatum Canu and Bassler, 1928
Figs. 337-341 (Smitt MCZ # 43)

Retepora marsupiata Smitt, 1873: 67 (in part), figs. 249?, 250.
Schizellozoon elongatum Canu & Bassler, 1928b: 123, pl 19, figs. 1-4.

Material Examined: MCZ # 43 [as] *Retepora marsupiata/Retepora cellulosa*. May 1, 2 D[redging] [off Sombrero] 262 fm. USNM COTYPE: 7587. *Schizellozoon elongatum* Alb. Sta. D2666. 30°47'30" N, 79°49'00" W, 270 fms.

Description: Colony consisting of a mass of regularly reticulate branches (Fig. 337). Fenestrae elongate, their width similar to or greater than branch width, and length about twice branch width. Zooids arranged in 2-3 alternating series. They are subhexagonal to irregularly polygonal in shape, their outlines marked by slightly raised suture lines, distinct in young regions, but less so in older portions of branches, as they become obscured by the increasingly granular calcification of zooid frontal walls. There are a few large marginal pores, and a few scattered small pores. The primary orifice, semicircular according to Canu & Bassler's original description (text-fig. 23c), is surrounded by a peristome with an oblique proximal slit. Small oval avicularia are found on the margins of the frontal wall, and below the peristome (Figs. 338, 341) where they are sometimes replaced by larger proximo-laterally directed triangular avicularia. No ovicells were detected in the rather worn MCZ fragment, but are present in the USNM Co-type colonies. They are elongated and convex with a long narrowly U-shaped slit with a sharp slightly raised margin.

Discussion: Smitt did not recognize this species, apparently considering it to be a deep water variant of his *Retepora marsupiata*. Part of his description of *marsupiata* (on p. 68) appears to refer to *S. elongatum*, "besides these avicularia, small rounded ones, with elliptical aperture, are irregularly distributed on the front side of the stem." and "The retiform stem varies in the shape of its branches; sometimes, and this seems to be the case in the deeper regions of the sea, they are narrow, rounded, sometimes, f. i. in the colonies taken at the depth of 16 fathoms, they are broader, flattened." His illustrations are confusing, some are clearly *marsupiata*, but one or two might be *Schizellozoon*.

Distribution: Georgia (Maturo 1968), Florida.

Schizellozoon elongatum	Lz	Wz	Lo	Wo	Lav small	Wav small	Lav large	Wav large
N	6	6	6	6	6	6	6	6
MEAN mm	0.86	0.54	0.19	0.14	0.09	0.07	0.24	0.11
ST DEV mm	0.08	0.08	0.02	0.02	0.01	0.02	0.03	0.01
RANGE min	0.72	0.45	0.144	0.108	0.072	0.054	0.198	0.09
max	0.936	0.684	0.216	0.162	0.108	0.108	0.27	0.126

Class Stenolaemata

Order Cyclostomatida

Family Crisiidae Johnston, 1838

Genus *Crisia* Lamouroux, 1812

Crisia carolina, new species
Figs. 342-347 (Smitt MCZ #30, 165)

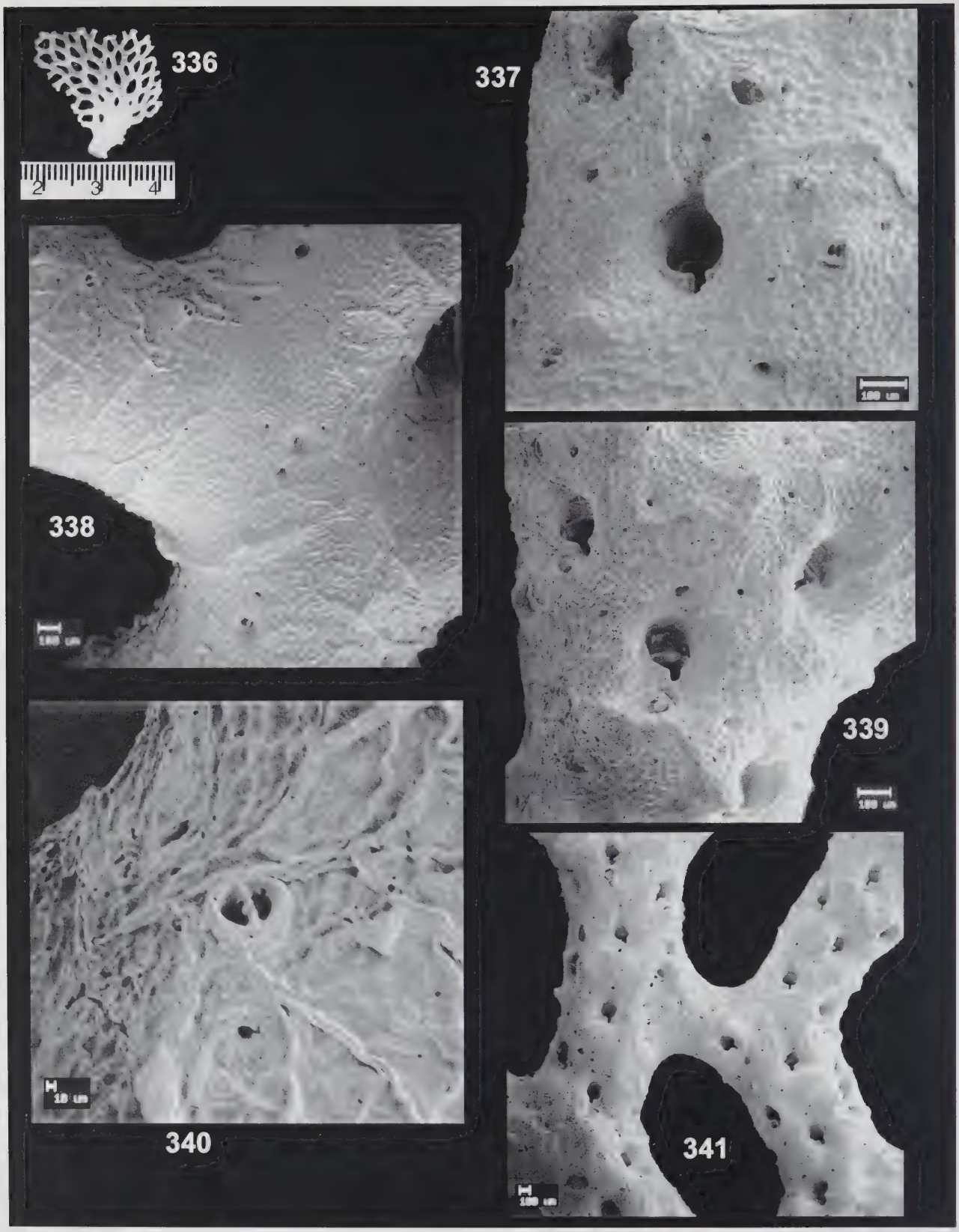
Crisia eburnea Smitt, 1872: 4., pl. I, figs. 1-5. NOT *Sertularia eburnea* Linnaeus, 1758: 810.
Crisia denticulata Smitt, 1872: 4. NOT *Cellaria denticulata* Lamarck, 1816: 182.
?*Crisia denticulata* Osburn, 1914: 185.

Holotype: Smitt MCZ # 30. *Crisia denticulata*. Off Cape Fear, N. Ca[rolina]. Bald Head Light, NNE 19 M[iles]. 9 fm. Pourtales Coll. 1868. *Paratype:* Smitt MCZ # 165. *Crisia eburnea*. [n.d.] Inside fishing ground off Cape Fear Riv. bar. 17 fms.

Etymology: The Smitt MCZ collection contains only two samples of *Crisia*, both from the vicinity of Cape Fear, on the North Carolina coast, thus the name *carolina*, given as a noun in apposition, "the Carolina one".

Diagnosis: *Crisia* with short, uncurved branch internodes, black joints, and a pyriform gonozooid with a short ooeciostome.

Description: Colony erect, branching, in short white tufts. Calcified biserial branches composed of straight (not in-curving) internodes composed of 7-9 zooids connected by chitinous dark-brown to black joints. Zooids connected except at their tips, the tips bent away from the branch axis (Fig. 346). Zooid openings circular (appearing oval where broken or viewed obliquely), some of zooid tips bluntly pointed (Fig. 344). Zooids covered with small pseudopores [density 1100-1300/m^2].



Figures 337-341. *Schizellozoon elongatum*. Smitt MCZ #43. Fig. 337. Colony, life-sized. Fig. 338. Two zooids with small avicularia. Fig. 339. Abfrontal surface. Fig. 340. Abfrontal surface showing fenestra. Fig. 341. Avicularium on abfrontal surface.

Figures 342-347. *Crisia carolina* new species. Fig. 342. Abfrontal surface of branches. Smitt MCZ # 165. Fig. 343. Growing tips of two branches. One branch tip fouled by tube worm. Smitt MCZ # 165. Fig. 344. Zooids on branch. Smitt MCZ # 165. Fig. 345. Branches of colony, showing internodes and branching pattern. Smitt MCZ # 30. Fig. 346. Fertile internode with gonozooid. Smitt MCZ # 30. Fig. 347. Gonozooid, showing oeciostome. Smitt MCZ # 30.

Gonozooid pyriform, with a very short ooeciostome tube leading to the transversely oval opening of the ooeciostome (Figs. 346, 347). Basis rami (the branching proximal part of the zooid from which a joint and new branch arise) is long, its tip reaching almost to the orifice of the zooid bearing it.

Discussion: Nomenclatural problems in Western Atlantic crisiids have arisen from their long synonymization with E. Atlantic forms or Indo-Pacific species, as well as from earlier uncertainty about characters that could differentiate species in the group. Smitt considered *Crisia denticulata* to be "*Crisia eburnea* in its highest state of evolution" saying "It is here captured in two varieties and illustrating what he considered to be a more *eburnea*-like and a more *denticulata*-like colony. However, the two MCZ samples, although one is named *eburnea* and one *denticulata*, appear to belong to the same species. *Crisia* found in the tropical Western Atlantic have either been described as *Crisia denticulata*, a Lamarck species ranging from Western Norway to the Mediterranean, or as *Crisia elongata*, a species with a slit-like ooeciostome, described by Milne-Edwards (1838) from the Red Sea and recorded from various localities in the Indo-Pacific region (Harmer, 1915: 96; Cook, 1968; 234). In reality there appear to be at least two black jointed species in the sub-tropical and tropical Western Atlantic, and neither can be synonymized with Old World taxa. Like *Crisia denticulata* Smitt's species has black joints and a pyriform gonozooid with a short ooeciostome tube. Unlike *Crisia denticulata* the Smitt MCZ species has short (not long, straggling) branches and colonies and short vs. long branch internodes (7-9 vs.15+ zooids). Marcus (1937:19, est. 1, fig. 4B; est. II, fig. 4A, C, D) described a new genus *Crisevia* for species with slit-like gonozooid openings, and a new black jointed Brazilian species, *Crisevia pseudolena*. Some Florida and Caribbean specimens may be *Crisevia pseudolena*. The Marcus species has longer sterile internodes (5-16) and fertile internodes with (10-19 zooids). The specimen illustrated by Winston (1986: p. 31 Figs. 71-73) from the Caribbean coast of Panama looks very much like the Marcus species.

Distribution: N. Carolina to Florida. Caribbean?

Crisia carolina	Lz	Wz	Lo	Wo	Lgz	Wgz
N	18	18	18	18	1	1
MEAN mm	0.66	0.11	0.09	0.07	0.56	0.31
ST DEV mm	0.11	0.01	0.01	0.01	ERR	ERR
RANGE min	0.522	0.09	0.09	0.054	0.558	0.306
max	0.936	0.126	0.108	0.09	0.558	0.306

Family Lichenoporidae Smitt, 1867

Genus *Patinella* Gray, 1848

Patinella sp.
Figs. 348-352 (Smitt MCZ # 119)

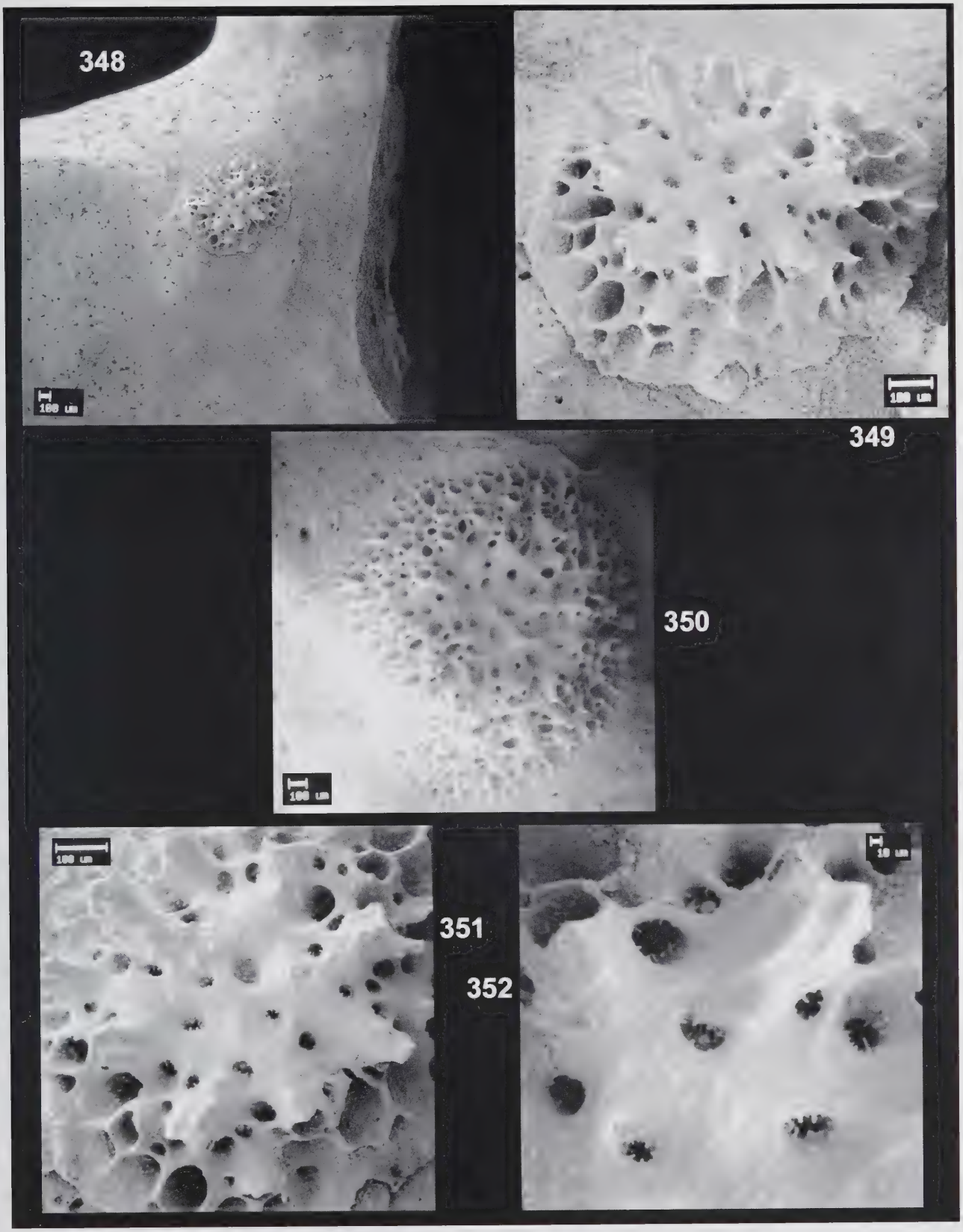
Lichenopora buski Osburn, 1940: 334, pl. 1, fig. 5. NOT *Lichenopora buski* Harmer, 1915. NOT *Lichenopora buski*? Canu & Bassler, 1928b: 163, pl. 29, Fig. 9.

Material Examined: Smitt MCZ # 119. [Not identified. Very worn branching coral fragment with young *Trematoecia* and two young *Patinella*]. May 23, 1869, Cast. No. 1, Off Pacific Reef, 30 fms. NMNH. Zool. Cat. no. 2377-1. *Lichenopora buski* Harmer Porto Rico. Sta. 2377 of Osburn, 6-11 fath. Between Rolones and Caribe Islands. Attached to algae and hydroid stems. USNM 70847. Holotype. *Lichenopora buskiana*. C&B. Pliocene, Bocas Island, Almirante Bay, Panama. USNM 7538. *Lichenopora radiata* Alb. Sta. 2319, North of Cuba, 23°10'37"N, 82°20'06"W, 143 f.

Description: Colony circular to oval in outline, with zooids forming a central mound, surrounded by a saucer-like peripheral lamina (Fig. 348). Zooids arranged somewhat irregularly, in a more or less quincuncial manner (Fig. 349), rather than radiating in uniserial rows, one above another. Zooids not connate, upper surface of zooid tubes showing 1 to 3 ridges and blunt-pointed tips. The surface of colony lamina, zooids and edges of alveolar spaces, pustulose to denticulate (Fig. 352). Calcification becoming heavier over the central region of the colony and alveolar spaces. No brood chambers occurred in the two Smitt MCZ specimens.

Discussion: As neither of the colonies from Smitt MCZ no. 119 had brood chambers, it is difficult to complete their identification. They were not identified in the material by Smitt, and they do not appear to belong to the species discussed by Smitt. His *Discoporella clypeiformis* (d'Orbigny) (Smitt, 1872: 12) from 130 fms, (illustration, pl. IV, fig. 31) is a *radiata*-like species with connate zooids in radiating uniserial rows. The two Smitt MCZ specimens do not match Canu & Bassler's (1928b: 164, pl. 34, fig. 7) *Lichenopora buskiana* from the Pliocene of Panama or the specimens they callled "*radiata*" (p. 163, pl. 29, figs. 1, 2). They do appear similiar to the Puerto Rican material of Osburn (1940: 334, pl. 11, fig. 5) which he described as *L. buski* Harmer. Small colonies in the NMNH sample are very like those shown in Figs. 348-52, in fact. Harmer (1915: 161, pl.) described *Lichenopora buski* from Indonesian *Siboga* material. It is very unlikely that the W. Atlantic material is conspecific, but these juvenile colonies are not adequate for the purpose of describing the Caribbean species. This can be done when material with brood chambers is available.

Distribution: Florida to ?



Figures 348-352. *Patinella* sp. Smitt MCZ #119. Fig. 348. *Patinella* colony on dead coral fragment. Fig. 349. Entire colony at higher magnification. Fig. 350. Second, larger colony of *Patinella* sp. Fig. 351. Portion of colony to show arrangement of zooids. Fig. 352. Pustulose to denticulate surface texture.

Family Tubuliporidae Johnston, 1838

Genus *Proboscina* Audouin 1826

Proboscina sp.
Figs. 353-354 (Smitt MCZ no. 125)

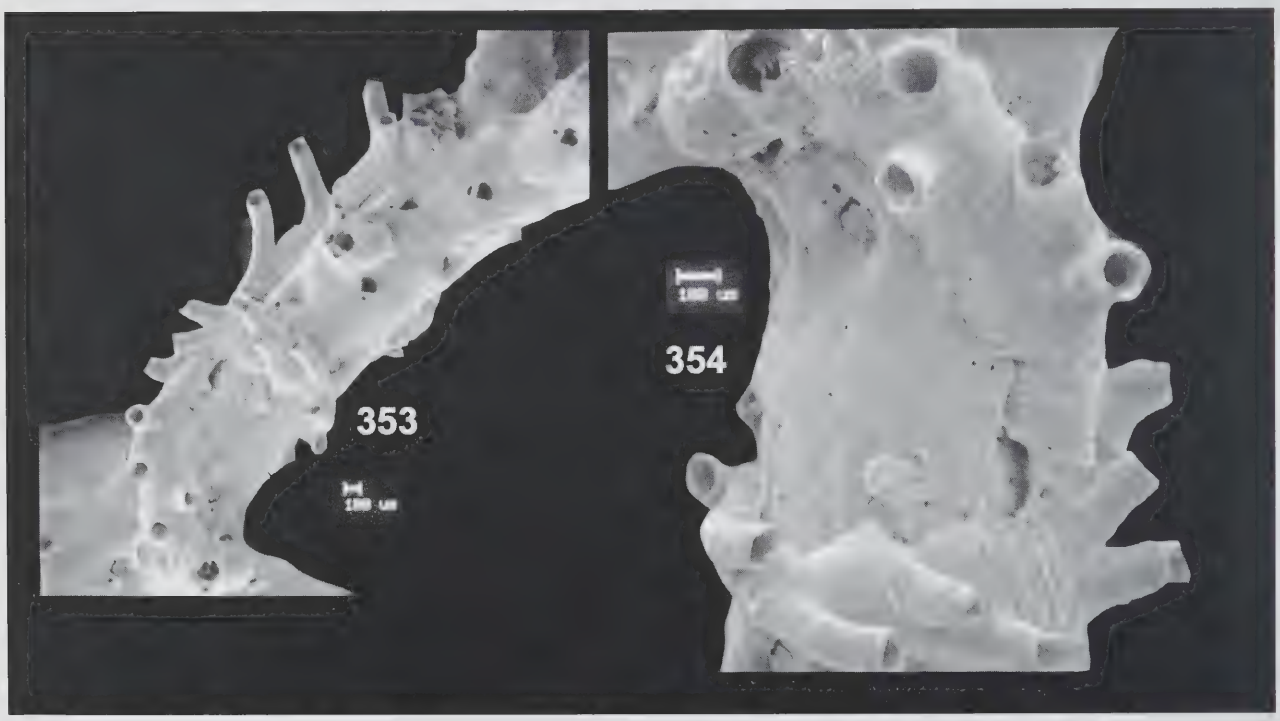
Proboscina sp. Maturo, 1957: 29, fig. 18 (possibly).
Proboscina robusta Canu and Bassler 1928c: 100, Pl. IX, fig. 4. NOT *P. robusta* Canu and Bassler 1928b: 157, pl. 30, fig. 7.

Material Examined: Smitt MCZ no. 125 [not identified by Smitt] On *Buskea margaritacea* branch. Jan. 16, Cast No. 13, W. of Tortugas, 68 fms., Pourt. 1869. USNM 7572. Holotype. *Proboscina robusta* C&B. Alb. Sta. 2319. North of Cuba. 23°10'37"N, 82°20'06"W, 143 fm. USNM 8574. *Proboscina robusta* C&B. Atlantic, E. of Bahia, Brazil. Norseman Sta. 348.

Description: Colony encrusting in runner form, growing on a branch of *Buskea margaritacea*. Zooid tubes arranged biserially, their distal ends curved up and away from the surface. Zooid calcification consists of faint pseudopores and more strongly demarcated transverse striations. No gonozooids present on the one colony in the Smitt MCZ Collection.

Discussion: Examination of the holotype of Canu and Bassler's *Proboscina robusta* (1928b: 157) showed that although the colony form is similar, *P. robusta* is a mmuch more massive species, with an orifice diameter twice the size of the diameter of the orifice on these specimens. However, the USNM specimen from Brazil, described and illustrated in their "Bryozoaires du Brésil" is similar in both size and morphology to the Smitt colony. However, as with the previous entry, formal description must await mature and reproductive material.

Distribution: Florida.



Figures 353-354. *Proboscina* sp. Smitt MCZ #125. Biserial colony attached to branch of *Buskee margaritacea*. Fig. 353. Fig. 354. Zooids at higher magnification.

Genus *Exidmonea* David, Mongereau, & Pouyet, 1972

Exidmonea flexuosa Pourtalès, 1867
Figs. 355-361, 366, 368, 370
(Smitt MCZ no. 75)

Idmonea flexuosa Pourtalès, 1867: 111.
Idmonea atlantica Smitt, 1872: 6, (In Part), pl. II, figs. 7-8. NOT *Idmonea atlantica* Forbes in Johnston, 1847: 278, pl. 48, fig. 3.
Idmonea atlantica Canu & Bassler, 1928b: 165, pl. 34, fig. 9.
Idmidronea atlantica var. *flexuosa* Osburn, 1947: 5.
Idmidronea flexuosa Lagaaij, 1963: 212, pl. VII, fig. 7; Harmelin & d'Hondt, 1993: 612, pl. I, B-D.

Material Examined: Smitt MCZ no. 75. *Idmonea atlantica?* = *Idmonea flexuosa* Pourt. Jan. 18 [1869]. Cast No. 3, W. of Tortugas, 60 fms. Pourt. USNM Cat. No. 70845. *Idmonea atlantica.* Pliocene, Minnitimmi Creek, Bocas Islands, Almirante Bay, Panama.

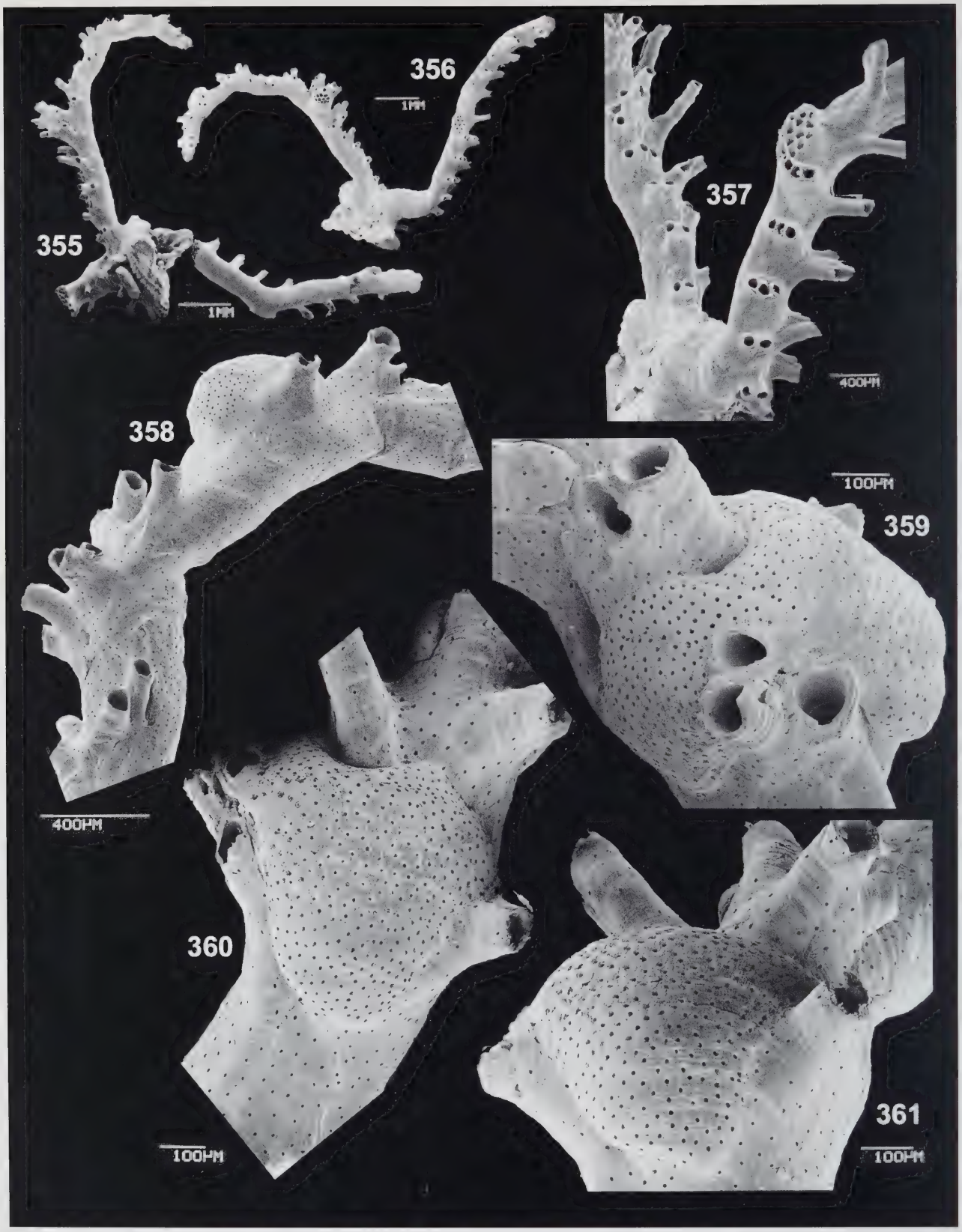
Description: Colony white, with erect curving unjointed branches arising from an encrusting base (Fig. 355). Zooids tubular in slanting connate rows, alternating to left and right along the frontal surface of the branches (Fig. 357). Some zooids with upper portion connate almost to tips, some free and curving for a greater length. Pseudopores about 5 μm in size. Density about 8-10/100 μm^2 on zooids. Calcification also shows fine striations (Fig. 361). Abfrontal surface with down-curved striations and a pseudopore density similar to that of zooids. One gonozooid present on one of the six branch fragments of the MCZ sample (Figs. 358-361). It consists of a sac-like expansion between the rows of zooid tubes on the frontal surface of the branch, its calcification shows the same transverse striations as zooids, but pseudopore density is higher, about 12-15/100 μm^2. No ooeciostome could be seen.

Discussion: The genus name *Exidmonea* is now used for idmoneid species that lack proximally directed kenozooids on the abfrontal surface of branches, as does Canu & Bassler's 1920 *Idmidronea*. Both taxa found in the Smitt MCZ collections appear to belong in *Exidmonea*. Smitt listed and illustrated two "*Idmonea*", one he called "*atlantica*"(within which he included as varieties both Pourtalès' "*flexuosa*" and a larger form from 15 fms, which he said, resembled "*Idm. serpens*"), and one he identified questionably as "*Milneana*". The MCZ collections do not have any of the *Idmonea* material from 15 fms, however, they do contain samples of wwhat appear to be two distinct taxa, one sample with 4 branch fragments of a small-tubed type (in which there was one fragment with a gonozooid) from 60 fms., and another sample of larger colony fragments with more robust branches, larger tubes, and more closely spaced autozooid pseudopores from 44 fms.

Smitt stated that Pourtalès had found "*atlantica*" at 60-270 fms. The MCZ material (collected from 60 fms) thus may have formed part of the basis for Smitt's description, although none of the MCZ branch fragments seem to be the one he illustrated. Harmelin (1973, 1976a) has described the variation that can occur in *Idmonea atlantica* in the Mediterranean and elsewhere, but although he has recorded the species from the Gulf of Mexico (1976a), Smitt's material looks very unlike the E. Atlantic-Mediterranean species illustrated by Hayward & Ryland (1985: 91, fig. 31) which shows more regularly arranged and evenly bifurcating branches, with even rows of connate zooids. Osburn's (1947) specimens from the lesser Antilles may belong with Smitt's material, as may Canu & Bassler's specimens from Panama Pliocene deposits (Canu & Bassler, 1928b: pl. 34, fig. 9). More recently, Harmelin & d'Hondt (1993) have also reported Pourtalès's *flexuosa* from deep water off Gibraltar at the mouth of the Mediterranean.

Distribution: Florida, Caribbean, Gulf of Mexico. Gibraltar.

Exidmonea flexuosa	Lz	Wz	Lo	Wo	Lgz	Wgz	Wperist
N	6	6	6	6	1	1	3
MEAN mm	0.92	0.13	0.07	0.09	0.79	0.65	0.44
ST DEV mm	0.19	0.01	0.01	0.01	ERR	ERR	0.01
RANGE min	0.72	0.108	0.054	0.072	0.792	0.648	0.432
max	1.17	0.144	0.072	0.09	0.792	0.648	0.45



Figures 355-361. *Exidmonea flexuosa.* Smitt MCZ # 75. Fig. 355. View of fragment of branching colony. Fig. 356. Another view of same fragment. Fig. 357. Close up of branches showing connate rows of zooids. Fig. 358. Branch with gonozoid. Fig. 359. Gonozooid viewed from above. Fig. 360. Gonozooid in side view. Fig. 361. Another view of gonozooid.

Exidmonea milneana (?) (d'Orbigny), 1839
Figs. 362-365, 367, 369,371
(Smitt MCZ No. 105)

Idmonea Milneana d'Orbigny, 1839: 20, pl. IX, figs. 17-21.
Idmonea Milneana Smitt, 1872: 8, pl. III, figs. 14-17.
(?) *Idmonea milneana* Canu & Bassler, 1920: 165, pl. 136, figs. 1-2.

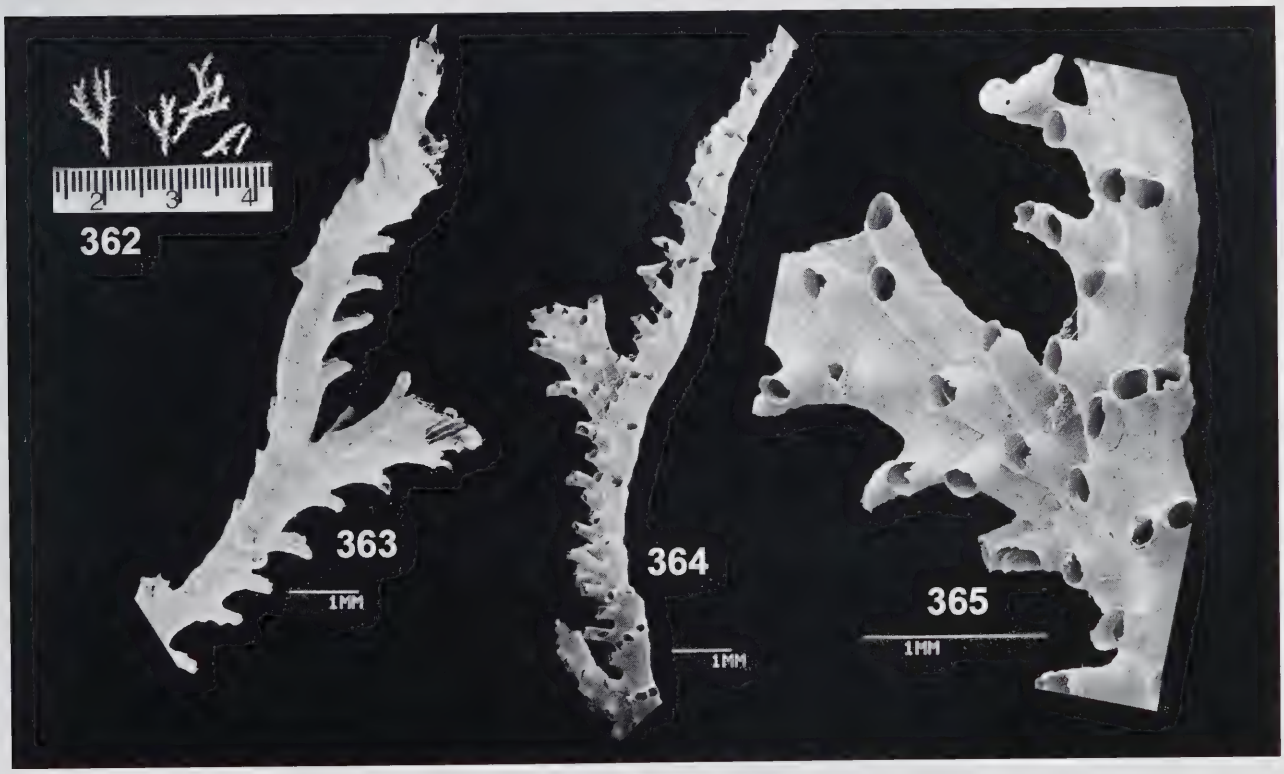
Material Examined: Smitt MCZ # 105. *Idmonea Milneana.* April 3, 1869, Cast No. 3, Off French Reef, 44 fms. Pourtales.

Description: Colony white, erect, unjointed and branching (Fig. 362). Zooid tubes larger and more robust, and orifices about double the size of those of the preceding species. Zooids tubular with noticeable transverse wrinkles in their calcification, along with ovoid pseudopores about 5 μFm in size, occuring in a density of about 15-16/100 μm^2 on the proximal portion of the zooids, but sparser and smaller on the distal portion. Zooids free (not connate) for about half their length, this distal portion curving away from the branch surface. Abfrontal surface lacking firmatopores, showing convex striations (Fig.363). No gonozooids present on any of the six MCZ branch fragments.

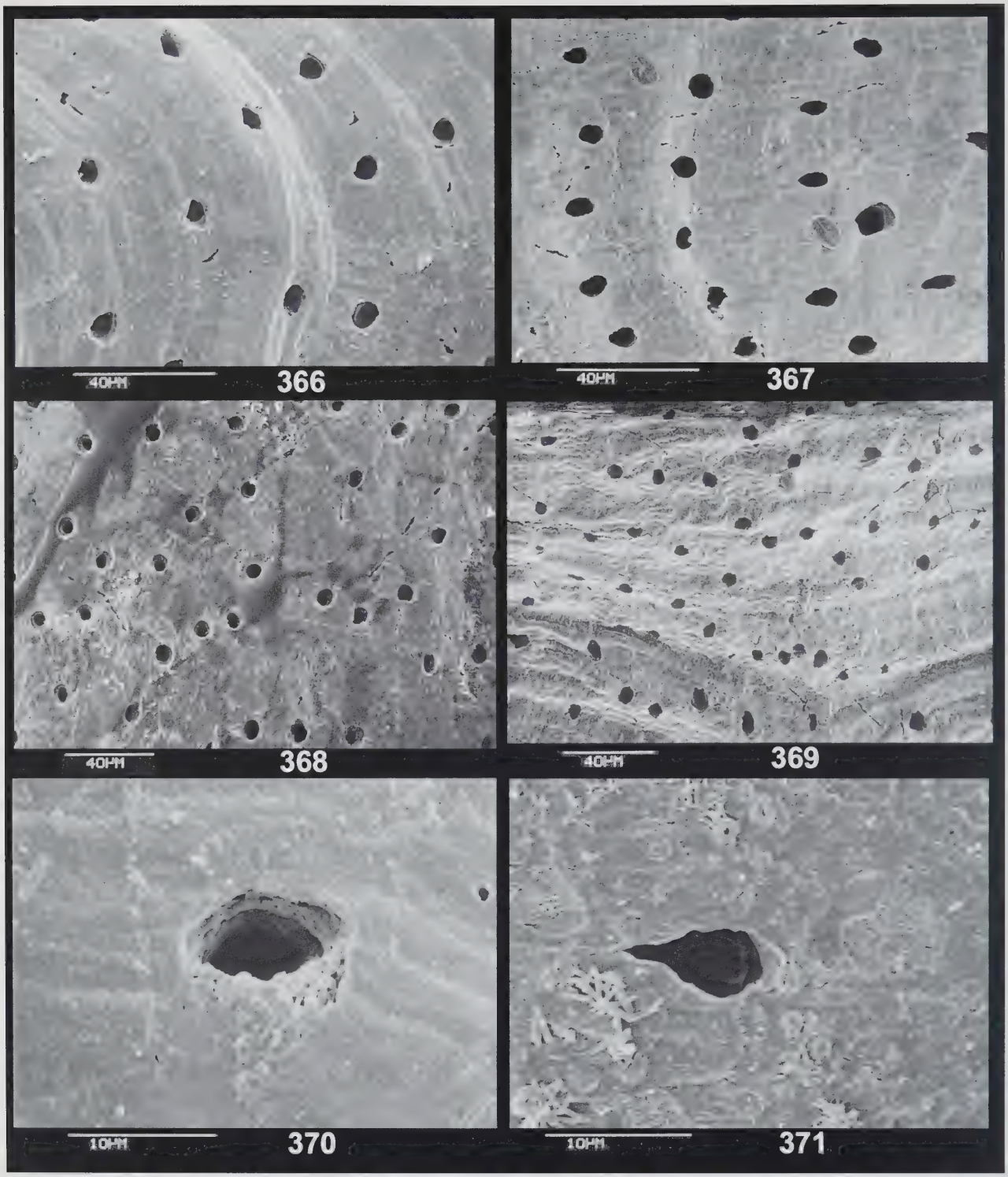
Discussion: Smitt identified his second species with *Idmonea milneana*, a Recent species described from the Falkland Islands by d'Orbigny (1839). D'Orbigny's original illustrations (pl. 9, figs. 17- 20) show a species with distal tips of zooids free and bent away from the colony surface, but zooids appear more evenly (orifices lined up in rows) and less quincuncially arranged than those of Smitt's fragment. D'Orbigny's illustrations show that his material also has down-curved striations on the abfrontal surface (pl. 9, fig. 20) and lacks abfrontal kenozooid structures, and thus would also now be placed in the genus *Exidmonea* rather than *Idmidronea.* Smitt's material also resembles Canu & Bassler's Tertiary southeast coast "*Idmonea milneana*" (Canu & Bassler 1920, both in the shape of the apertures and their (compared to other species) more separate and quincuncially arranged character, as well as in the convex striations on the dorsal side (See Canu & Bassler, 1920: pl. 136, figs. 1-2). In addition to zooid measurements pseudopore density can be determined from SEM study. Pseudopore density was somewhat higher in the *milneana* (Figs. 367, 369) than in *flexuosa* (Figs. 366, 368), although the size of the pseudopores was very similar (Figs. 370, 371). Until material with gonozooids becomes available, it may not be possible to resolve the identification of this sample.

Distribution: W. Atlantic: Florida - ?

Exidmonea milneana	Lz	Wz	Lo	Wo
N	6	6	6	6
MEAN mm	1.17	0.22	0.17	0.19
ST DEV mm	0.24	0.03	0.02	0.03
RANGE min	0.9	0.18	0.144	0.144
max	1.62	0.252	0.198	0.234



Figures 362-365. *Exidmonea milneana.* Smitt MCZ # 105. Fig. 362. Colony branches, life-sized. Fig. 363. Abfrontal surface of branch. Fig. 364. Frontal surface of branch. Fig. 365. Zooids showing arrangement on branch.



Figures 366-371. *Exidmonea flexuosa* and *Exidmonea milneana*, taken at the same magnifications, contrasting pseudopore patterns in the two species. Fig. 366. *Exidmonea flexuosa*. Smitt MCZ # 75. Fig. 367. *Exidmonea milneana*. Smitt MCZ # 105. Fig. 368. *Exidmonea flexuosa*. Smitt MCZ #75. Fig. 369 *Exidmonea milneana* Smitt MCZ #105. Fig. 370. *Exidmonea flexuosa*. Smitt MCZ #75. Fig. 371. *Exidmonea milneana* Smitt MCZ # 105.

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Annotated Catalogue of Specimens Collected by L. F. De Pourtalès in Florida and Carolina, Belonging to the Museum of Comparative Zoology, Harvard University

Numbering: Tom Schopf numbered the material in the collection from 1 - 183. His typed draft catalogue (dated July 1967) lists the specimens in each lot. However, some of the specimens were missing – either the container was empty or was itself missing when the collection was received by Winston at AMNH. Because Tom died not long after that, and his lab at Chicago was cleaned out, and its contents dispersed, it has not been possible to trace these missing specimens. In addition, some of the lots (#s 156 to #160) are not from the 1868-69 Coast Survey collections. They are European specimens that Smitt may have donated to the MCZ for comparative purposes. Number 162 is from a later US Coast Survey cruise that is part of the MCZ holdings, but it is not part of the material Smitt studied, in fact, it contains a sclerosponge, not a bryozoan.

Key: The species name following the number is that given on original internal label. All data written or typed on the original internal label are given without brackets and with the original capitalization and punctuation (or lack of punctuation). Current name is given in parentheses and bold italics; notes and explanations concerning label data are in brackets. Some labels had printed data, with the species name handwritten. Others had entirely hand-written labels, and were probably written when lots were subdivided during the identification process. When data lacking on the label could be determined from other information (e.g., a specimen was from the same date and dredge number as a completely labelled specimen), the missing information is given in the brackets. Some specimens had additional labels tied to the outside of the container (for those in test tubes or bottles) or written upon it (those in cardboard boxes). This was often an updated name, e.g., a *Tessaradoma boreale* tag on a specimen originally labelled by Smitt: *Anarthropora borealis*. Printed 1868 label text reads: "U. S. Coast Survey, B. Peirce, Supt. Gulf Stream Explor. F. de Pourtales, Assist. 1868."

Information on colony size, condition, and amount of material is given in parentheses, following the label data. Dry colonies that had cuticle and opercula still in place were considered to have been alive when collected; dead, worn, or skeletal specimens are also noted.

Specimens illustrated in this work and specimens measured are noted in bold type and brackets.

Specimen containers: When Tom Schopf received the collection, many of the specimens were housed in old test tubes. Judging from their cracked and broken edges the tubes had probably been discarded from the chemistry laboratory, but they were still considered good enough for dry specimen storage. Other dry specimens were stored in cardboard pill boxes of various sizes and shapes. Most specimens were dried, a few (as noted) were still in original glass stoppered jars that contained alcohol. Schopf re-housed some of the specimens whose containers were broken in modern glass vials. The test tubes and vials tended to roll around in storage drawers and most of the cardboard boxes were broken and crumbling by the time they were received by Winston, who re-housed most of the specimens, along with their original label data, in uniform sized plastic boxes approved for collections storage. The type of container originally used is noted in brackets in the catalogue.

1. *Cellepora avicularis* (= ***Turbicellepora pourtalesi,* n. sp.**) [original species name erased] 7. D. May 1 [7th Dredging] [off Sombrero] 111 fm. Pourt. 1868. [test tube] (branching fragments on hydroid stem, dry, with cuticle).

2. *Cellepora tuberosa* (= ***Buskea minutiporosa***) [original species name erased] May 11 Cast no. 16 [off Sand Key] 138 fm. [Printed label] 1868, [test tube] (white,ovoid mound-shaped colony, 9X6 mm, worn, but still with golden brown opercula in place. Some of large avicularia such as Smitt shows in Fig. 110(#?).

3. *Cupularia stellata* ? (= ***Cupuladria biporosa***) 2 miles S. off Rebecca shoal. 10 fm. Pourt. 1868 [Attached tag]: Membranipora canariensis [test tube] (Large, 10x10x14 mm, dead colony with one edge broken. **[Colony #1 measured].**

4. *Cellepora margaritacea* (Pourt.) [original generic name erased] (=***Buskea margaritacea***) May 11, 1869 Cast no. 6 Off Conch reef 117 fm [Printed label;] 1868 [test tube]. **[SEM, Figs 268-271] [Colony #1 measured].**

5. *Hippothoa biaperta* [original generic and species names erased] [original names: *Escharella biaperta* ??] forklinen Hetrydalum [???] of *Lepralia celleporoides* [this line crossed out] = *scharella linearis affinis* [this line crossed out] (=***Stephanollona serrata***) May 1 Cast No. 7 26 fms. Pourt. 1868 [test tube] (encrusting, hollow pink tube). **[SEM, Figs 321-323, 325,326] [Colony #1 measured].**

6. *Anarthropora borealis*, *Cellepora tuberosa* [original species name erased] (= ***Tessaradoma boreale, Buskea***

minutiporosa). May 2 #3 D(redging) [off Sombrero] 183 fms. Pourt. 1868 (3 fragments, 1 loose, 2 attached to vermetid or worm tubes, with cuticle).

7. *Cupularia stellata* ? **(= *Cupuladria biporosa*).** Jan 22 3rd D[redging] [Printed Label;] 1868 [attached tag]: *Membranipora canariensis.* (4 colonies, 3 skeletal: 11x10x13 mm, 10x10x3.5 mm, 5x4x1.5 m. 1 live: 7x6x1.5 mm **[= Colony #2 measured]** [test tube].

8. *Cellepora margaritacea* (Pourt.) [original generic name erased] **(=*Buskea margaritacea*)** [May ll?] 11 D[redging] off Sand Key 116 fm. Pourt. 1868 (2 branch fragments, with cuticle). [Vial].

9. **Specimen missing.** *Eschara cervicornis* [original species name erased] (= [May ll?] ll# D(redging] off Sand Key 116 fm. Pourt. 1868 [test tube] Specimen missing, never received from Schopf.

10. ? *Porina decussata* [M... ???] [in pencil;] *Porina subsulata* [in ink] **(=*Bracebridgia subsulcata*) Syntype.** 1868 2 miles S. of Rebecca Shoal 10 fm. [Printed label] 1868 (10 skeletal colony branches). [test tube].

11. *Hippothoa biaperta* [original generic and species names erased] on *Cellepora* - form of linearis - gruppen = *Escharella linearis affinis/ :Cellepora stadium* **(This sample contains 3 colonies,** one = ***Parasmittina floridana*** **(=Holotype),** one = ***Stephanollona serrata,*** one = ***Stephanollona asper*)** January 18 Cast No. 3 SW of Tortugas 60 fms. Pourt. 1869 (All specimens with cuticle). [test tube].

12. *Anarthropora borealis* **(=*Tessaradoma boreale*).** May 1 7# D(redging] [off Sombrero] 111 fms. Pourt. 1868 [Attached tag: *Tessaradoma boreale*] [test tube]. (4 branch fragments embedded in calcareous matrix, cuticle present.

13. *Escharipora stellata* vertes! **(=*Triporula stellata*). Syntype.** May 11 7# D[redging] [off Sand Key] 103 fm., Pourt. 1868 [On back of label:] Type for Smitt, Floridan Bryozoa. figs. 130 and 133. [Attached tag: *Escharipora stellata*][test tube] (Colony is about 6x8 mm, encrusting on piece of coral rubble, white in color with glistening iridescent cuticle).**[Colony # 2 measured].**

14. *Cupularia stellata* ? **(*Cupuladria biporosa* and other species — see notes on each colony).** May 20 4RM 29 fm. Pourt. 1868. [Attached tag: *Membranipora canariensis*] [test tube]. (9 colonies including SEMed colony: (1) **[Figs. 34, 37]** ***Trypostega striatula*** **(=Holotype)** colony on inside, also SEMed **[Figs. 101-103],** and measured **[*Trypostega* colony # 1 measured].** Colony broke when removed from stub. (2) 12x10x3 mm, live, chunk missing, apparently damaged in life. (3) 10x9x3 mm, live, young colony of ***Pourtalesella incrassata*** **[Colony # four measured]** and a few ***Aetea*** zooids present on undersurface. (4) 9x8x3 mm, half broken, skeletal colony. Very small ***Floridina*** sp. on undersurface. (5) 9x8x2 mm, live. (6) 8.5x7.5x2, live. (8) 7x7x2 mm, dead. (9) 6x6x2 mm, dead.

15. *Cupularia* 3. **(=*Cupuladria doma*)** May 20 4RM 29 fm. Pourt. 1868 [Attached tag: *Cupularia doma*] [test tube]. **[SEM, Figs. 38-39] [Colony # 1 measured]** (3x2x3 mm, very tall, skeletal colony).

16. [No label inside vial.] [Attached tag:] *Cribrilina radiata* **(=*Puellina saginata*, n. sp.). Holotype.** May 4 Cast no. 11 [off Bahia Honda] 176 fm. Pourt. 1868 [test tube] (On tan shelll, bored, and with some sponge still attached to inside. **[SEM Figs. 83-88] [Colony #1 measured].**

17. *Cupularia lowei* ? (med. *C. denticulata* att *jemfira*) **(=*Discoporella depressa*)** Off W. bar, Cape Fear River. 7 fm. Pourt. 1868 [Attached tag: *Cupularia umbellata*] [test tube] **[SEM, Figs. 40-43] [Colony #1 measured]** (very worn and abraded skeleton).

18. [No identification] **(=*Steginoporella magnilabris*)** March 13 East key 13 fm. [Printed label;] 1868 [Attached tag:] *Steginoporella elegans* [Test-Tube] (Broken, skeletal, bilaminar frond).

19. [No identification.] **(=*Bracebridgia subsulcata*) Syntype.** March 13 East key/Florida 113 fm. Pourt. 1868 [Attached tag: *Porina subsulcata*] [test tube] (4 small branch fragments, all worn and skeletal; attached tag missing).

20. *Cellepora tuberosa* [original generic name and species name erased] **(=*Buskea minutiporosa*).** May 1 4 D[redging] [off Sombrero] fm. [75 ? fm] Pourt. 1868 [test tube] **[Colony # 2 measured]** (with cuticle, ovicelled, nodular colony).

21. *Hippothoa biaperta* [original generic name erased] **(=*Pourtalesella incrassata*)** Inside Fishing ground off Cape Fear, Kid Bar (?) 17 fm. Pourt. 1868 [test tube] **[Colony #1 measured]** (encrusting *Amathia* sp., developing into small bilamellar fronds, live and ovicelled when collected).

22. *Hippothoa mucronata* **(= *Hippopleurifera mucronata*). Syntype.** May 20 4 RM 29 fm. Pourt. 1868 [test

tube] **[SEM, Figs. 143-145] [Colony # 1measured]** (specimen skeletal, but skeleton orange-brown and shining, single layered, ovicelled, encrusting on calcareous substratum, 6x9 mm). [Not listed on label, but present on undersurface of calcareous substratum = ***Reginella floridana*, (Holotype or syntype?)** small skeletal and partly broken colony; may be holotype of this species, and specimen illustrated as his Fig. 111] **[SEM, Figs. 98-100] [Colony #1 measured].**

23. *Cellepora margaritacea* (Pourt.) **(=*Buskea margaritacea*)** May 11 (Dredge 11] [off Sand Key) 128 fm. Pourt. 1868 [test tube] (four branch fragments).

24. *Porellina ciliata Hippothoa biaperta* **(= *Microporella protea* and *Pourtalesella incrassata*)** Jan. 27 1 1/4 mi. S. of Sand Key 10 fms.Pourt. 1868 **[*Microporella* =SEM, Figs. 211-213] [*Microporella* = colony #1 measured]** [test tube] *Microporella*, three young colonies on orange octocoral. 2 colonies mounted for SEM, measurement on larger) (*Pourtalesella*, 1 young colony on orange octocoral).

25. *Escharipora stellata* [original generic and species erased] **(=*Triporula stellata*) Syntype.** May 6 Cast No. 7 [off American shoal] 98 fms. Pourt. 1868 [test tube] **[SEM, Figs. 107-112] [Colony # 1 measured]** (Old colony encrusting nodular calcareous substratum, has grown new layers over old).

26. *Micropora coriacea* L. **(= *Micropora acuminata*, n. sp.)** May 6 Cast No. 7 [looks like 27 to JW] [off American Shoal] 98 fms. Pourt. 1868 [test tube] **[SEM, Figs. 69-72] [Colony # 1 measured].** (small colony on calcareous substratum, still some cuticle, so probably live when collected; no ovicells) but otherwise matching specimen of Winston (1982) Fig. 39).

27. *Cupularia stellata* **(=*Cupuladria biporosa*)** Tortugas Pourt. 1868 [test tube] (3 specimens, 9 mm, 8 mm and 6 mm in diameter, all dead, skeletal, but skeletons fresh, not worn).

28. *Hippothoa spongites* [original generic and species erased] **(=*Stylopoma minuta*)** March 13 East Key/Florida 13 fm.Pourt. 1868 [test tube] **[colony #1 measured]** (large, 13l x21w mm, ovicelled colony encrusting a platy piece of calcareous algae, presumably detached from a larger substratum).

29. *Gemellipora eburnea* **(=*Gemellipora eburnea*) Syntype.** May 9 2nd 13 [=Cast 13?] [off the Samboes] 121 fm. 1868.[Vial]. **[SEM, Figs. 104-106] [Colony #1 measured]** (several small pinnate branch fragments, two small ones taken for SEM).

30. [No name on label in vial. Attached tag: *Crisia denticulata*] **(=*Crisia carolina*, n. sp.=Holotype).** Pourtales coll./ 68. Bald Head Light NNE 16 mi. Off Cape Fear N. C. 9 fm. [Vial] **[SEM, Figs. 345-347] [Colony #1 measured]** (numerous broken branch fragments with dark-brown to black joints, SEMed 2 branches, one with gonozooid).

31. *Nellia oculata* ?? [Attached tag: *Nellia oculata*] **(=*Nellia tenella*)** May 4 Cast No. 10 (off Sand Key] 82 fm Pourt. 1868 [[Vial] **[SEM, Figs. 16-19] [Colony #1 measured]** (entire small colony, 7 mm height .x 5 mm width, attached to clump of calcareous substratum, still has cuticle. Label data now so faded as to be almost totally illegible, but number of fms looks more like 148 or 198 than 82 to JW).

32. *Anarthropora borealis* **(=*Tessaradoma boreale*)** May 11 5th D[redging] [off Sand Key] 82fm. Pourt. 1868 [Attached tag: *Tessaradoma boreale]* [Vial] (2 small branch fragments, 1 dead with sponge overgrowing it, 1 with cuticle].

33. *Anarthropora borealis* **(=*Tessaradoma boreale*)** May 11 7t D[redging] [off Sand Key] 103 fm Pourt. 1868 [Attached tag:] *Tessaradoma boreale*] [Vial] (2 branch fragments, 1 dead and sponge encrusted, one with cuticle).

34. *Discopora albirostris* **[no specimen:** test tube broken and specimen missing when collection received by Schopf] Jan. 21 1 D[redging] 17 fms. Pourt. 1868 [test tube].

35. *Nellia oculata* **[= ???]** Jan. 11 off Tortugas 13 fms. 1868 [No.] 342 (?] [on side of vial]. [Very small vial] (only a few scattered zooid fragments remain inside vial; they may belong to *Canda*, not *Nellia*).

36. [No inside identification] [Attached tag: *Crisia denticulata*] Inside Fishing Ground, Cape Fear 7 fm. (Printed label) 1868. [Vial: transferred from open box to vial by T. Schopf, Sept. 29, 1966] (Inside vial is only *Crisia* "dust", shattered zooids, sand grains and debris).

37. *Anarthropora borealis* [Attached tag: *Tessaradoma boreale*] **(= *Tessaradoma boreale*)** [Printed Label=] 1868. [Small glass stoppered bottle] (label data was in pencil on back of printed 1868 label, so bleached or faded that it was almost unreadable, but by repeat xeroxing and darkening date could be read as May 8, "Off Alligator" [reef] which would make it 1869 **[Colony #2 measured]** (Four good fragments with cuticle, probably most of four separate colonies; one is still attached to worm tube).

38. *Cellularia cervicornis* Busk (**=*Scrupocellaria regularis***) off W. bank Cape Fear River 7 fm. [Label badly faded] [Printed Label.] 1868 [small glass stoppered bottle; measured colony on paleo-slide] **[Colony #2 measured]** (mass of dried up, broken branches).

39. *Cellepora tuberosa* (**=*Buskea minutiporosa***) [May 11, Dredge 11 off Sand Key] 306 fathoms Pourtales 1868 [large glass stoppered bottle] (three colonies, one dead and abraded, on brachiopod shell, 1 colony free from any substratum, one with cuticle, ovicelled, encrusting a vermetid tube **[=Colony # 3 measured]).**

40. *Cellularia cervicornis* Busk? (**=*Scrupocellaria regularis***) [locality data completely faded and invisible] [on printed 1868 Label] [small glass stoppered bottle, still in alcohol, replenished with 70% EtOH, 17 Jun 2002] **[Colony # 3 measured].**

41. *Cellepora margaritacea* [*Vincularia* erased] [outside label: *Vincularia margaritacea= Cellepora margaritacea]*(**=*Buskea margaritacea***) 5th D[redging] [off Sand Key] 82 fm [printed label:1868] [round box] (11 branch fragments, part live, part skeletal, no ovicells + 1 branch fragment of *Tessaradoma boreale*).

42. *Cellepora margaritacea* [*Vincularia* crossed out) [outside label] *Cellepora margaritacea* [original generic and species names erased] (**=*Buskea margaritacea***) 5 D[redging] May 9, 1868, 80 fms.[Round Box] (22 branch fragments including two small ovicelled fragments).

43. *Retepora marsupiata Retepora cellulosa* [outside label, species name illegible] (**=*Schizellozoon elongatum***) May 1 2 D[redging] (off Sombrero] 262 fm. (Printed label] 1868 [round box] **[=Colony #1 measured]** (This is an old reticulate colony base of *Schizellozoon*, a different species than other reteporids in collection) **[SEM, Figs. 337-341].**

44. *Cellepora margaritacea* [outside label] *Vincularia margaritacea Cellepora margaritacea* (**=*Buskea margaritacea***) May 4 7th D[redging] [off Bahia Honda] 100 fm. [printed label] 1868 [round box] (13 various sized fragments, at least 2 large avicularia, no ovicells).

45. *Anarthropora borealis* [outside label: *Anarthropora borealis*] [Attached tag: *Tessaradoma boreale*] (**=*Tessaradoma boreale***) May 11 11 D(redging] [off Sand Key] 128 fm. 1868 [round box] (7 colony fragments, 4 with bases attached to tubes, cuticle, no ovicells).

46. *Steginoporella elegans* (**=*Steginoporella magnilabris***) Jan 21 1 D[redging] 14 fm. [printed label:] 1868 [round box] (dead, skeletal and abraded colony).

47. *Biflustra denticulata/* Busk (**=*Biflustra denticulata***) Jan. 27 1/14 miles S. of Sand Key 10 fm. Pourt. 1868 [outside of box says 111. 2. 3.11 as though containing part of a series] [cardboard "match-box"][**SEM, Figs. 1-3] [Colony #1 and #2 measured]** (in two boxes now, separated, SEMed and measured colonies from rest of material. Two colonies forming nodular masses around dried stems, ?gorgonians. 10 fragments on mollusk shell.

48. *Biflustra savartii* verte (***Biflustra arborescens***) May 25 4 RM 29 fm. [on printed side of 1868 printed label, other side of label has written on it] Type for Smitt, Floridan Bryozoa, fig. 95 [outside of box says 117. 8. 9. 10.11 as though part of a series] [cardboard box] **[SEM, Figs. 4-6] [Colony #1 and colony #2 measured]** (8 branching fragments, colony #2 measured is Smitt's Fig. 95 specimen).

49. *Cellepora margaritacea*, Smitt = *Vincularia margaritacea* Pourt. (**=*Buskea margaritacea***) May 16 Off Sand Key 120 fm. [printed label 1868 [cardboard "match-box"][**Colony #3 measured]** (29 branch fragments, including some with ovicells).

50. *Anarthropora borealis* (**=*Tessaradoma boreale***) [May 11?] 11 D[redging] Off Sand Key 116 fm [Printed label=] 1868 [Cardboard "match-box"] (11 branch fragments, growing from bases on calcareous tubes, some with cuticle, no ovicells).

51. *Anarthropora borealis* [Printed tag:*Tessaradoma boreale*] (**=*Tessaradoma boreale***) May 4 11 D[redging] [off Bahia Honda] 176 fm. [Printed label] 1868 [Cardboard "match-box"] (8 fragments, with cuticle, some attached to tubes, no ovicells).

52. *Anarthropora borealis* [attached tag: *Tessaradoma boreale*] (**=*Tessaradoma boreale***) May 2 3 D[redging] [off Sombrero]183 fm. [Printed label=] 1868 [cardboard "match-box"] (24 fragments, some with cuticle, no ovicells).

53. *Porina ciliata* and *Escharella biaperta* [modified to] *Porellina ciliata* and *Hippothoa biaperta* [outside label] *Porina ciliata* [crossed out] *Escharella biaperta ?* [crossed out] (**= *Microporella protea, Pourtalesella incrassata?***) Jan. 27 1 1/4 miles S. of Sand Key 16 fms. Pourt. 1868 [Cardboard Box] [Number on side of the box]

5. [***Microporella* = colony #2 measured**] (*Microporella protea* on one side of a shell, young colony consisting of broken, abraded skeletons of 13 zooids; *Pourtalesella incrassata*? on other side (same side as a serpulid tube) Colony of *Pourtalesella* is very small, may not even be this species).

54. [outside label:] *Hippothoa spongites Escharella jacotini Escharella*(?) *landsborovii* [inside label:] *Hippothoa spongites*; *Escharella jacotini*; *Escharella landsborovii* minuscule (**=*Stylopoma minuta, Parasmittina betamorphaea,* and *Phylactellipora aviculifera***) [Jan 11] Tortugas 12 fms. Pourt. 1868 [cardboard box] [number on side of box] 1 **[SEMS, *Stylopoma* = Figs. 187-189, *Parasmittina betamorphaea* = Figs. 155-160, *Phylactellipora* = Figs. 171-173] *Stylopoma*= Colony #2 measured, *Parasmittina* = colony #1 measured, *Phylactellipora* = colony #1 measured]** (a calcareous nodule, completely encrusted by these colonies).

55. *Escharella plana* [crossed out] *bisinuata* (**=*Petraliella bisinuata*) Syntype.** May 4 Cast No. 1 (off Bahia Honda] 19 fms. Pourt. 1868 [cardboard box] 3. [number on side of box] **[SEM, Figs. 224-226] [Colony # 1 measured].** (tubular, unilamellar branching colony growing around a dried substratum which may have been an ascidian).

56. *Escharella* [crossed out] *Hippothoa biaperta Cellepora avicularis* [not original species name], and on *Serialaria* [outside label] *Hippothoa biaperta* and *Cellepora avicularis* on *Serialaria* sp. (**=*Pourtalesella incrassata*** and ***Turbicellepora pourtalesi*** on dried out colony of *Amathia convoluta*). Inside Fishing ground off Cape Fear, Kid Bar 17 fms. Pourt. 1868 [cardboard box] 16 [number on side of box].

57. *Discopora* [species name not readable] [outside label] *Discopora albirostris* (**=*Celleporaria albirostris*** and ***Celleporaria magnifica*)** Tortugas [printed label=] 1868 [cardboard box] **[*C. albirostris* = colony # 3 measured; *C. magnifica* = colony # 1 measured].**

58. *Vincularia margaritacea* [outside label] *Vincularia margaritacea*, Pourt. *Cellepora margaritacea*, Smitt [Esc... var. 7 erased] (**=*Buskea margaritacea*)** May 1 7 D[redging] [off Sombrero 111 fm. [printed label:] 1868 [cardboard box] (9 fragments, some live, some ovicelled).

59. *Vincularia margaritacea* (outside label) *Cellepora margaritacea* = *Vincularia margaritacea* Pourt. [*E. t.* var. = *Cellepora contiq.* erased] (**=*Buskea margaritacea*)** May 11 7th D[redging] [off Sand Key] 103 fm. [printed label;] 1868 [cardboard box] (21 fragments, including basal portions immersed in sponge, some with cuticle, some with ovicells).

60. *Cellepora avicularis* (**=*Turbicellepora pourtalesi*, n. sp.) Holotype.** Inside fishing ground off Cape Fear Riv. Bar 17 fm. [printed label;] 1868 [cardboard box] **[SEM, Figs. 279-285] [Colony #1 measured].** (number of fragments attached to hydroid stolons, with cuticles, and with dried embryos still visible in ovicells).

61. *Tessaradoma boreale* [*Membranipora canariensis* crossed out] [outside label] *Anarthropora borealis* (**=*Tessaradoma boreale***) [May 16] 4 D[redging] Off Sandy Key 120 fm. Pourt. 1868. Second label inside box with *Tessaradoma boreale* [cardboard box] **[SEM, Figs. 148-151, 154] [Colony #3 measured]** (three colony branches, one attached to hydroid stem, with cuticle).

62. *Vincularia margaritacea* [outside label] *Cellepora margaritacea* (Pourt) = *Vincularia margaritacea* = *Cellepora margaritacea* (**=*Buskea margaritacea***) May 6 D[redging] 7 [off American Shoal] 98 fm. [printed label:] 1868 [cardboard box] (numerous fragments, some embedded in sponge).

63. *Cellepora* [outside label] (**= *Hippotrema janthina, Celleporaria albirostris, Stylopoma* sp.**) 3d. D[redging] SW of Loggerhead 9 fms. [printed label:] 1868 [also contains handwritten label with] *Lepralia ianthina* [and] *Discopora albirostris*? 3 D SW of Loggerhead, Depth 9 fms. [Cardboard Box] **[*Hippotrema*, SEM, Figs. 305-309] *Hippotrema*, colony #1 measured]** (Sample consists of a large calcareous nodule mostly made up of layers of dead *Celleporaria albirostris* colonies, also has *Stylopoma* colony, very young, no ovicells, species indeterminate).

64. *Cellepora margaritacea* [outside label] *Cellepora margaritacea* [original species name erased] (**=*Buskea margaritacea***) May 9 12 Dredge [off the Samboes] 123 faths. 1868 [second inside label says *Cellepora margaritacea*] [cardboard box] (numerous branch fragments, with cuticle, sponge covered).

65. *Vincularia margaritacea*, Pourt. *Cellepora margaritacea*, Smitt [third name erased] (**=*Buskea margaritacea***) May 9 14th D[redging] [off the Samboes] 125 fm [Printed label] 1868 [Cardboard Box] (numerous branch fragments, with cuticle, sponge covered).

66. *Cellepora margaritacea* [outside label] *Vincularia margaritacea*, Pourt. = *Cellepora margaritacea*, Smitt

(=***Buskea margaritacea***) [handwritten label] Jan 18 Cast No. 3 SW of Tortugas 60 fms Pourt. 1869 [cardboard box] (one large thicket of branches, plus numerous loose branch fragments).

67. *Discopora landsborovii* [outside label] *Discopora skenei* [*skenei* crossed out] *Discopora albirostris* (=***Celleporaria albirostris***) May 1 [4?] 1 D[redging] [off Bahia Honda] 19 fm. [printed label:] 1868 [Note in Swedish on back of label] "Tycks vara ett mellantadrium mitr. Disc. Lk Bork D. Sk. 3." [cardboard box].

68. *Anarthropora borealis* [Attached Tag] *Tessaradoma boreale* (=***Tessaradoma boreale***) May 8 Cast No. 10 Off Alligator Reef 188 fms Pourt 1868 [test tube] **[SEM, Figs. 152-153] [Colony #4 measured]** (Young colony branch,with cuticle, base broken off, with ovicells, measured as colony 4 to get ovicell measurements).

69. *Cupularia stellata?* [Attached tag:] *Membranipora canariensis* (=***Cupuladria biporosa***) Apr 3 Cast No. 3 Off French Reef 44 fms. Pourt. 1869 [test tube] (colony with cuticle and vibracula).

70. [No identification] [Attached tag:] *Porina subsulcata* (=***Bracebridgia subsulcata***) **Syntype**. Jan 16 Cast No. 5 W. of Tortugas 36 fms. Pourt. 1869 [Test-Tube] (7 branch fragments, including two with cuticle, encrusting calcareous substrata fouled by dried up colonial ascidian and sponge).

71. [No identification] [Attached tag:] *Porina subsulcata* (=***Bracebridgia subsulcata***) **Syntype.** Jan 16 Cast No. 6 W. of Tortugas 36 Pourt. 1869 [test tube] (two branch fragments with cuticle).

72. **[Specimen missing]** [Attached tag:] *Vincularia abyssicola* (=***Smittipora levinseni***) March 4 Cast No. 1 Off Cojima, Cuba 450 fms. Pourt 1869 [Evidently one of the two specimens found by Pourtales probably figure 60 of Smitt's Floridan bryozoa; hence, type] [test tube] This specimen missing from collection when received from Schopf.

73. *Porina serrulata* [original generic and species names erased as well as following information: B-n[?] 128, 129, 129a, 130, 131] (=***Colatooecia serrulata***) Syntype**.** Jan 16 Cast No. 6 W. of Tortugas 35 fms. Pourt. 1869 [test tube] **[SEM, Figs. 257-261] [Colony #1 measured].**

74. *Porina subsulcata* [original generic and species names and numerical data erased] (=***Bracebridgia subsulcata***) Jan 16 Cast No. 7. W. of Tortugas 35 fm. [printed 1868 label, but]1869 [Written in ink on it] [test tube] (6 colony fragments with cuticle).

75. *Idmonea atlantica* ? = *Idm. flexuosa* Pourt. [Attached tag:] *Idmonea atlantica* (=***Exidmonea flexuosa***) Jan 18 Cast No. 3. W. of Tortugas 60 fms. Pourt. Jan 18 Cast No. 3 W. of Tortugas 60 fms. Pourt. [test tube] **[SEM, Figs. 355-362, 366,368,370 [Colony #1 measured]** (4 branch fragments, one with gonozooid SEMed).

76. *Escharella jacotini* (*Parasmittina spathulata?*) on *Porina serrulata* (=***Colatooecia serrulata***)**. Syntype.** April 3. Cast No. 3. Off French Reef. 44 fms. Pourt 1869 [test tube](SEM picture of the "*Escharella*", but no specimen remaining on stub – apparently disintegrated in SEM, so not discussed further).

77. [No identification] [Name on back of label erased] (=***Bracebridgia subsulcata***) **Syntype.** January 16, 1869 Cast No. 11 W. of Tortugas 43 fm. [Printed 1868-1869 label] [test tube] **[Colony #2 measured].**

78. *Cellepora tuberosa* [Part of original generic and whole of original species names erased] (=***Buskea minutiporosa***)**.** April 21, Cast No. 5 Off Key West 120 fms. Pourt. 1869 [test tube].

79. *Lepralia edax* [original generic and species name erased] March 21 Cast No. 3 Off Elbow reef 49 fms. Pourt. 1869 [test tube] (This specimen has two bryozoans encrusting around hollow chitinous? tubes: a colony of *Triporula stellata*, and, overgrowing it, a colony of *Stephanollona* sp. There is no *Hippoporidra edax* in the sample).

80. *Gemellipora glabra* [Original generic name erased.] (=***Gemelliporina glabra***) **Syntype.** Jan 16. Cast No. 5 W. of Tortugas 36 fms. Pourt. 1869 [test tube] **[SEM, Figs. 247-256] [Colony #1 measured]**

81. [No identification] Jan 16 Cast No. 7 W. of Tortugas 35 f. Pourt. 1869 *Porina violacea* [on separate handwritten label] (=***Reptadeonella bipartita***) [Apparently the only specimen collected by Pourtales, but not figured by Smitt although discussed by him] [test-tube] **[SEM, Figs. 121-122] [Colony # 1 measured]** (encrusting a calcareous nodule, 10x14 mm, colony still a dark grayish purple color, one fragment taken for SEM).

82. *Cellepora tuberosa* [part of generic and whole of original species name erased.] (=***Buskea minutiporosa***) Feb. 11 Cast No. 3. S. of Marquesas 140 fm. Pourt. 1869 [test tube] (Small, round, colony, 5x5 mm).

83. *Discopora albirostris* (= ***Celleporaria albirostris***) **Syntype.** May 4 Cast No. 1 19 fms. Pourt. 1869 [test tube] **[SEM, Figs. 132-135] [Colony #1 measured].**

84. **[Specimen Missing]** *Hippothoa porosa Vincularia abyssicola Micropora coriacea* Jan 16 Cast No. 13 West off Tortugas 68 fms. Pourt. 69 [test tube] (MISSING, this sample never received from Schopf).

85. *Cellepora tuberosa* [part of generic and whole of original species names erased.] (=***Buskea minutiporosa***) February 15 Casts No. 4 et 5 Off Boca Grande 125 fms. Pourt. 1869 [test tube] (three raised, mound-shaped colonies).

86. *Hippothoa biaperta* and *Cellepora avicularis* [Generic name of first and generic and specific name of second erased.] (= ***Pourtalesella incrassata* and *Turbicellepora pourtalesi*, n. sp.**) Off Cape Fear, Bald head Light NNE 14 m 9 fms. Pourt. 1869. [test tube] (*Pourtalesella* overgrowing *Turbicellepora* which is growing around a hydroid or gorgonian stem).

87. *Porina plagiopora* (=***Reptadeonella hastingsae***) *Escharella pertusa* [original generic and specific names erased.] (= ***Escharina porosa***) (and also present, but not identified by Smitt, ***Hippoporina caribaea, n. sp.*** = **Holotype** and ***Puellina testudinea*, n. sp. = Holotype**) Jan 18 Cast No. 3 W. off Tortugas 60 fms. Pourt 1869 [test tube] **[*Reptadeonella hastingsae* =colony # 1 measured, *Hippoporina caribaea, n. sp.* =Holotype. [= colony #1 measured, *Escharina porosa* = colony#1 measured] [SEM *Reptadeonella hastingsae*, Figs. 123-128, *Hippoporina caribaea*, Figs. 174-178, *Escharina porosa* = Figs. 227-230, *Puellina testudinea*, Figs. 94-96]** (4 species present: *Reptadeonella hastingae*, large colony on calcareous substratum. It was in the process of overgrowing small colonies of several other species, a *Puellina*, *Microporella* and *Aimulosia*, as well as *Escharina porosa* and *Hippoporina caribaea*, which may be the species Smitt identified as "pertusa", rather than the *Escharina porosa*. The *Puellina antillana* is broken, skeletal, and almost buried under the *Reptadeonella*; not enough remains of the *Microporella* and *Aimulosia* to give specific identifications).

88. *Cellepora tuberosa* [Original specific name erased] (=***Buskea minutiporosa***) May 8 Cast No. 10 Off Alligator reef 118 fm. [Printed 1868-1869 label] [test tube].

89. *Cellepora tuberosa* [original generic and specific names erased] (=***Buskea minutiporosa***) April 21 Cast No. 1 Off Key West 135 fm. Pourt. 1869 [test tube].

90. *Lepralia cleidostoma* (=***Schedoleidochasma cleidostomum***) **Syntype.** May 1 Cast No. 7 26 fms. [Sombrero Key] Pourt. 1868 [hand-written label] [test tube] **[SEM, Figs. 244-246] [=colony #1 measured]** (mound-like, frontally budded colony, with cuticle, ovicells).

91. *Anarthropora borealis* (=***Tessaradoma boreale***) March 4 Cast No. 1 Off Cojima, Cuba 450 fms. Pourt. 1869 [test tube] (two branch fragements with cuticle, no ovicells).

92. *Lepralia turrita* "ooecius preedita" (=***Trematooecia turrita***) **Syntype.** April 3 Cast No. 3 Off French Reef 44 fms. Pourt. 1869 [test tube] [Fig. 291] [Colony #1 measured] (three colonies. Largest was measured. Ovicelled, with cuticle, on a tubular calcareous substratum).

93. *Porina serrulata* verte! ["Type for Smitt, Floridan Bryozoa, Figs. 116-120" written on back of label] (=***Colatooecia serrulata***) **Syntype.** Jan. 16 Cast No. 12 W. of Tortugas 42 fms. Pourt. 1869 [test tube] **[=colony #3 measured]** (branching colony attached to stalk-like, hydroid or gorgonian substratum, thick iridescent cuticle which made measurement difficult).

94. *Escharipora stellata Hippothoa biaperta* [original generic and specific names erased.] (=***Stephanollona asper***) Jan. 18 Cast No. 3 SW of Tortugas 60 fms. Pourt. 1869 [test tube]. **[SEM, Figs. 315-320] [=colony # 2 measured]** (sample contains neither of the species mentioned, but has *Stephanollona asper* colony).

95. [No identification] (=***Bracebridgia subsulcata***) **Syntype.** March 10 [Cast No 2] Off Double-headed [Shot] Key 471 fms. Pourt. 1869. [Attached tag] *Porina subsulcata* [test tube] (six skeletal and worn, bored, or abraded branch fragments).

96. *Cupularia stellata?* (=***Cupuladria biporosa***) March 21 Cast No. 8 Off Carysfort reef 35 fms.Pourt. 1869 [Attached tag] *Membranipora canariensis* [test tube] (6x7x1 mm, live when collected, cuticle and vibracula mandibles attached).

97. [No identification] (=***Steginoporella magnilabris***) Jan 1869 Florida [W. of Tortugas ?] 35-36 fm. Pourt [Attached tag] *Steginoporella elegans* [test tube] **[SEM, Figs. 74-75] [=Colony #1 measured]** (Three fragments, one SEMed and measured).

98. **[Specimen missing]** *Membranipora trifolium* April 3 Cast No. 3. Off French reef 44 fms. Pourt 1869 [Attached

tag] *Mollia antiqua* [testttube] SPECIMEN MISSING. Never received from Schopf.

99. *Anarthropora borealis* (= ***Tessaradoma boreale***) March 10 Cast No. 2 Off Double headed Shot Key 471 fm. Pourt. 1869 [Attached tag] *Tessaradoma boreale* [test tube] (four branch fragments, can see hydroid stem on which one had settled and surrounded. One fragment has ovicells developing at tip of branch).

100. [No inside vial label] (***=Scrupocellaria pusilla***) **Syntype.** [Attached tag] *Cellularia pusilla* Jan. 16 Cast No. 13. W. off Tortugas 68 fms. Pourt. 1869 [test tube] **[SEM, Figs. 57-62] [Colony #1 measured]** (Two SEMed fragments and small box with 4 branch fragments).

101. *Cupularia stellata?* (***=Cupuladria biporosa***) March 31 Cast No. 1 Off Carysfort reef 52 fms. Pourt. 1869 [Attached tag] *Membranipora canariensis* [test tube] (4x5x2 mm, abraded skeletal, much repaired colony).

102. *Cupularia stellata?* (***=Cupuladria biporosa***) Jan. 18 Cast No. 3. SW of Tortugas 60 fms. Pourt. 1869 [test tube] (Large colony, 10,8x3 mm, live when collected, with cuticle and mandibles).

103. [Attached tag:] *Bugula flabellata* Jan [22] 1869 [Cast No. 3] Florida, S. on Rebecca Channel 16 1/2(?) Fm wr. [?] Pourtales [test tube].

104. *Eschara abe...* [?] [generic and specific name erased from back of label] (***=Bracebridgia subsulcata***) **Syntype.** March 21, 1869 Cast No. 8 Off Carysfort reef 35 fms. [Printed label of 1868-1869] [Attached tag] *Porina subsulcata* [test tube].

105. [No inside vial label] [Attached tag] *Idmonea Milneana* (***=Exidmonea milneana***). April 3, 1869 Cast 3 Off French reef 44 fms. Pourtales [test tube] **[SEM, Figs. 362-365, 367, 369, 371] [=Colony #1 measured]** (tubes much more robust than other *Exidmonea* sp., orifices double in size, 6 branch fragments, none with gonozooids, one fragment SEMed).

106. No identification] (***=Triporula stellata***) **Syntype.** Jan. 16 Cast No. 12 W. of Tortugas 49 fms.Pourt. 1869 [Attached tag] *Escharipora stellata*] [Test-tube] **[=Colony #3 measured]** (Colony encrusting calcareous alga covered stem or tube).

107. [No identification] (***=Triporula stellata***) Florida Pourt. 1869 [only information on label] [test tube] (small nodular colony on calcareous substratum).

108. *Mamillopora cupula*, Sm.(***=Mamillopora cupula***) **Syntype.** [on separate label] May 11 Cast No. 1 Off Conch Reef 30 fms. Pourt. 1869 [test tube] **[Fig. 236] [=Colony #1 measured]** (Two colonies, larger one 4.5 mm diameter x 2.5 mm height., with cuticle and opercula, measured as Colony #1, smaller, skeletal and fouled by sponge 3mm diam.x 2 mm ht.).

109. *Lepralia turrita* [original species name erased] (***=Trematooecia turrita***) **Syntype.** Jan. 16 Cast No. 9 W. of Tortugas 37 fms. Pourt. 69. [test tube] **[SEM, Figs. 292-297] [Colony #2 measured]** (small ovicelled colony, with cuticle and opercula when collected, cleaned for SEM).

110. *Hippothoa biaperta* [original generic and species names erased] *Cellepora studium* (***Stepanollona asper***) January 16 Cast no. 12 W. of Tortugas 42 fms. Pourt. 1869. [test tube] **[Colony #3 measured]** (Small colony encrusting irregular calcareous substratum, live and ovicelled when collected).

111. *Mamillopora cupula*, Sm. (***=Mamillopora cupula***) **Syntype.** [On separate label] Jan 16. Cast No. 5 W. of Tortugas 36 fms Pourt. 1869 [test tube] **[Colony #2 measured]** (Colony 3 mm diam. X 2 mm ht., cuticle, 3 ovicells).

112. *Cellaria tenuirostris* Busk (***=Cellaria bassleri***) Jan. 16, 1869 [Cast No. 13] W. off Tortugas 68 fammen Pourtales. [test tube] **[SEM, Figs. 76-82] [Colony #1 measured]** (Four large branch fragments, and 4 small fragments, SEMed).

113. *Retepora cellulosa marsupiata* (***=Reteporellina marsupiata***) **Syntype.** [On separate label] Jan 22 Cast No. 3 S. of Rebecca channel 16 ½ fms. ch (?) (162?) Pourt. 1869. [test tube] **[colony #2 measured]** (4 very small fragments).

114. *Escharipora stellata* (***=Triporula stellata***) **Syntype.** [May 8, Dredge 4, Off Alligator reef] Florida 68 fms. 1869 Pourtales [test tube] (small colony with frontally budded layer with cuticle on top of old partially skeletal layer, on calcareous substratum).

115. *Bugula flabellata* (***=Bugula rylandi***) (Jan 21. Cast No. 3 S. of Rebecca Channel 16 1/2 fms. Pourt. 1869. [test tube] **[SEM, Figs. 44-46] [Colony #1 measured]** (Two small colony branches, one SEMed).

116. [No identification] [Attached tag] *Membranipora canariensis* (***=Cupuladria biporosa***) Jan 15, 1869 Cast No. 4 S. of Tortugas 34 fm. [Printed 1868-1869 label] small glass stoppered bottle] (Two colonies, both with cu

ticle, vibracula, larger one bored: 7x8x1 mm, 10x11x3 mm).

117. *Anarthropora borealis* [On separate label] [Attached tag:] *Tessaradoma boreale* (**=*Tessaradoma boreale***) Feb 11, 1869 Cast No. 3 S. of Marquesas 140 fm [printed 1868-1869 label] [small glass stoppered bottle] (Three pretty complete small colonies with encrusting bases, cuticle, no ovicells).

118. *Hippothoa biaperta* 12 am[?] onside fishing grd. off Cape Fear Riv. 17 fm. Printed 1868-1869 label. [second label, same specimens:] *Cribrilina innominata Escharipora stellata Hippothoa porosa* (*Hyndmanni*) *Hippothoa biaperta* Jan 16 Cast No. 12 W. of Tortugas 42 fms. Pourt. 1869 [vial, supplied by TJM Schopf] (Vial contains two separate samples, the first consists of a colony consisting of at least two layers, cuticle, ovicelled, on a calcareous tubeworm, could be from either of localities listed, but most likely is the "*Hippothoa biaperta*" from Cape Fear (**=*Stephanollona serrata***) **[Colony #3 measured].** The second sample contains *Cribellopora constellata* on a calcareous substratum, has cuticle, but is partially fouled by sponge, plus part of a *Puellina* colony, of which only 4 broken zooids exist, also a few broken zooids of another species all on a calcareous substratum consistent with a Florida Keys location. (**=*Cribellopora constellata*= Holotype) [SEM, Figs. 231-235] [Colony #1 measured].**

119. [Not identified] (**=*Trematooecia turrita* and *Lichenopora* sp.**) May 23, 1869 Cast No. 1 off Pacific Reef 30 fm. [Printed 1868-1869 label] [Vial supplied by TJM Schopf] (Sample consists of a piece of branching coral, possible, a very worn *Oculina* sp., with two bryozoan colonies, a young *Trematooecia turrita*, skeletal, no ovicells and a young *Lichenopora* sp., also skeletal). **[*Lichenopora* sp., SEM, Figs. 348-352].**

120. *Cellepora margaritacea* = *Vincularia Margaritacea* (**=*Buskea margaritacea***) Pourt. April 21 Cast No. 1 Off Key-west 135 fms. Pourt. 1869. [vial, supplied by TJM Schopf] (one small and one larger fragment, both with cuticle).

121. *Discopora albirostris* (**=*Celleporaria albirostris* =Syntype. and *Trematooecia aviculifera***) Tortugas [handwritten label, no other data] [jar supplied by TJM Schopf] [*T. aviculifera* SEM, Figs. 299-304 and colony #2 measured] (Small encrusting colony of *T. aviculifera*, with cuticle, also has small colonies of *Puellina smitti* **=Holotype. [SEM, Figs. 89-93],** *Microporella* sp. and *Cribellopora constellata*).

122. *Discopora albirostris* (**=*Celleporaria magnifica***) Jan 16, Casts Nos. 6 & 7 West of Tortugas 35 fms Pourt. 1869 [cardboard box] (Two large pieces, one platy, one nodular, both with cuticle and with ovicells). **[SEM, Figs. 139-141].**

123. *Discopora albirostris* (**=*Celleporaria albirostris***) Jan 16. W. of Tortugas [Casts 6 & 7?] 35 fms. Pourt. 1869 [cardboard box] (worn tubular colonies, mostly skeletal, but showing regeneration in patches).

124. *Retepora cellulosa - marsupiata* [original generic and specific names erased] (**=*Reteporellina marsupiata*). Syntype.** Jan 22. Cast No. 3 S. of Rebecca Channel 16½ fms. Pourt. 1869. [cardboard box] **[SEM, Figs. 327-336] [Colony # 1 measured]** (branching, narrow fans).

125. *Vincularia margaritacea*, Pourt. *Cellepora margaritacea*, Smitt (original species name for *Cellepora* erased] (**=*Buskea margaritacea)*** [also contains ***Cellaria bassleri, Scrupocellaria pusilla, Canda retiformis, Tubulipora* sp., and *Halophila antillaea*].** Jan 16 Cast No. 13 W. of Tortugas 68 fms. Pourt. 1869. Verte! *Hippothoa porosa* [on cover of box] B-n[?] 144 14 [on side of box] obs. *Cellaria!* [on back of label]. [cardboard box] (45+ branch fragments, including several large, ovicelled fragments, of *Buskea margaritacea.* In this species the large old branches have ovicells. Box also contains fragments of *Cellaria bassleri, Scrupocellaria pusilla, Canda retiformis, Tubulipora* sp., and *Halophila antillaea*, n. sp. **[SEM, Figs. 47-52] [Colony #1 measured]** No. *E. porosa).*

126. *Escharella depressa rostigera* (**=*Hippaliosina rostrigera***) **Syntype.** [original specific names erased] Jan 16. Cast No. 11 W. of Tortugas 43 fms. Pourt 1869 *Escharella jacotini, 2 depressa, rostigera* [on cover of box; *jacotini* crossed out] 9 [on side of box] [cardboard box] **[*Hippaliosina* = Colony # 2 measured]** (Large platy unilaminar colony of *Hippaliosina rostrigera*, with cuticle and orangish color remaining and with many gonozooids; on reverse are dead *Hippaliosina* and *Steginoporella magnilabris* colonies, as well as one branch of *Gemelliporina glabra* (with cuticle).

127. *Hippothoa spongites* (**=*Stylopoma projecta***) [NOTE: this sample has two labels: first label] January 16, 1869. Cast No. 6, W of Tortugas 35 fms. [second label] January 16, 1869 Cast No. 5 W. of Tortugas 36 fms. Printed 1868 on label. *Hippothoa spongites* (in ink] *Mollia vulgaris* [erased] 13 [on side of box] [cardboard box] **[SEM, Figs. 190-195] [Colony # 1 measured]** (Sample consists of 20+ fragments of one or more tubular colonies).

128. *Escharella* [crossed out] *Hippothoa isabelleana* (**=*Cribellopora constellata***) Jan. 16 Cast No. 12 W. of Tortugas 42 fms. Pourt. 1869. *Escharella Isabelleana* [on cover of box.] [cardboard box] **[SEM, Figs. 233-235] [Colony #2 measured].** (Two fragments. Colony was encrusting on calcareous nodule, broken apart for SEM of larger piece. Smaller piece also has *Stephanollona serrata* and *Reptadeonella bipartita* colonies). [*Stephanollona serrata* = Colony # 2 measured].

129. [label on cover] Bryozoa. (**=*Tessaradoma boreale***) February 11, 1869 S. of Marquesas Cast No. 2 132 fathoms [Attached tag] *Tessardoma boreale* [label on underside of box:] *Anarthropora borealis* [round box] (Two small colonies attached to tube substratum).

130. [label on cover] Bryozoa. *Cellepora margaritacea* (**=*Buskea margaritacea***) February 15, 1869 Off Boca Grande Casts no. 4 &5 145 fms. [Label inside box] *Cellepora margaritacea* [Round box] (Seven branch fragments, cuticle, no ovicells).

131. Bryozoa. *Cellepora margaritacea* (**=*Buskea margaritacea***) February 15, 1869 Off Boca Grande Cast no. 1 125 fms. [Label inside box] *Cellepora margaritacea* [round box] (Eight thick mature branch fragments, cuticle, no ovicells).

132. Bryozoa. *Cellepora margaritacea* (**=*Buskea margaritacea***) February 17, 1869. SW. of Sand Key Cast no. 2 125 fms. (Label inside box] *Cellepora Margaritacea.* [Round box] (31 branch fragments, cuticle, no ovicells; some are sponge encrusted).

133. Bryozoa. *Anarthropora borealis* (**=*Tessaradoma boreale***) Feb 17, 1869 SW of Sand Key Cast no. 3 138 fms. [Attached tag] *Tessaradoma boreale* [Round box].

134. Bryozoa (**=*Callistopora agassizii***) **Syntypes.** March 4, 1869 Cast no. 1 Off Cojima, Cuba 450 fms. [on underside of box] *Membraniporella Agassizii* [Attached tag:] *Membraniporella Agassizii* [round box] **[SEM, Figs. 7-14] [Colony #1 measured]** (Three branch fragments, all live when collected. One coated and SEMed).

135. Bryozoa. (**=*Celleporaria sherryae***) March 21, 1869 Cast no. 3 Off Elbow reef 49 fms. [Label inside box:] *Cellepora avicularis* [original species name erased] March 21 Cast no. 3 Off Elbow reef 49 fms. Pourtales 1869. [On underside of box] *C. ramulosa ?* [*ramulosa* ? crossed out and *avicularis* substituted] [round box] **[SEM, Figs. 141-142] [Colony #1 measured]** (No *Turbicellepora* in this sample. It is a worn and abraded *Celleporaria sherryae* colony which is still identifiable by its distinctive orifice).

136. [No label inside, on cover] Bryozoa (**=*Cupuladria biporosa***) March 21, 1869 Off Carysfort reef Cast no. 7 40 [fms] [on underside of box:] *Membranipora canariensis* [round box] (skeletal colony, 4.5x4.5x2mm).

137. [On cover](**=*Mamillopora cupula***) **Syntype.** Invertebrates March 21, 1869 Off Carysfort reef Cast no. 6 48 fms. [on underside of box] *Mamillopora cupula* Sm. [plus word crossed out] [label inside box:] *Mamillopora cupula*, Sm. [round box] **[illus. Fig. 236]** (One tall, dead colony, 4x4x4 mm).

138. *Mamillopora cupula* Sm. Lunulites [crossed out] (**=*Mamillopora cupula***) **Syntype.** March 21, 1869 Off French reef Cast no. 2 45 fm. [label inside box] *Mamillopora cupula*, Sm. [round box] **[SEM, Figs. 237-243] [Colony #3 measured]** (two colonies, 2.5 diam. x 2.5 ht., 3 diam. x 3 ht, both dead when collected, smaller of two was scanned for figure, and measured as colony #3).

139. Bryozoa. *Cellepora margaritacea* (Pourt.) avicularia (**=*Buskea margaritacea***) March 21, 1869 Off Carysfort reef Cast no. 5 60 fms. (label inside box] *Cellepora margaritacea* [round box] (7 colony fragments, 4 ovicelled, but all or mostly skeletal).

140. *Steginoporella elegans* Bryozoa (**=*Steginoporella magnilabris***) April 3, 1869 Off French reef Cast no.1 15 fms [label inside box] *Steginoporella elegans* [ound box] (Tubular branch fragment with cuticle and good B zooids, **Fig. 73**, this paper).

141. Bryozoa (**=*Micropora acuminata*, n. sp.=Holotype.** and ***Buskea minutiporosa***) April 21, 1869 Off Key West Cast no. 1 135 fms. [on underside of box:] *Celleporaria* ["*ria*" crossed out] *tuberosa Micropora coricea* S. [Label inside box:] *Cellepora tuberosa* and *Micropora coriacea* [ound box] [***Micropora acuminata*=colony #2 measured**] (two colonies occur on curved outer surface of a fragment of sea urchin test, both live when collected, *Micropora* has 47 zooids, but no avicularia or ovicells).

142. [On top of box] *Anarthropora borealis* [attached tag] *Tessardoma boreale* (**=*Tessaradoma boreale***) [Inside label] May 6 [1868. American Shoal Cast no. 7] 98 fms. [round box] (Three branch fragments, 2 with cuticle, one skeletal and bored, attached to tube, no ovicells).

143. Bryozoa (**=*Buskea margaritacea***) May 7, 1869 Off Tennessee reef Cast no. 6 115 fms. [on underside of box] *Vincularia margaritacea* Pourt. [label inside box] *Cellepora margaritacea* [round box] (three skeletal branches).

144. Bryozoa. (**=*Buskea minutiporosa***) May 7, 1869 Off Tennessee reef Cast No. 9 174 fms. [on underside of box:] *Cellepora tuberosa* [label inside box;] *Cellepora tuberosa* [round box] **[SEM, Figs. 273-278] [Colony #1 measured]** (Two nodular colonies, one coated and SEMed, also measured as Colony #1).

145. Bryozoa 86. (**=*Cupuladria biporosa***) May 8, 1869 Off Alligator reef Cast nos. 2 & 3 44 fms. [on underside of box] *Membranipora canariensis* [round box] **[SEM, Figs. 30-33]** (Two colonies, 7x6x1 mm and 5x6x1 ½ mm, smaller of two SEMed, but not measured).

146. *Vincularia margaritacea* (**=*Buskea margaritacea***) [label inside box] *Vincularia margaritacea*, Pourt. = *Cellepora margaritacea*, [*margaritacea* written in over earlier, erased name] Smitt (hiraventill *C. granulosa* gruppen) [*granulosa* written over earlier, erased name] May 8 Cast no. 7 Off Alligator reef 110 fms. Pourt. 1869 [cardboard box] (Four branch fragments, with cuticle, but sponge encrusted, no ovicells).

147. *Discopora* (**=*Celleporaria albirostris***) [label inside box] *Discopora albirostris* [original generic and species names erased] Viran sambandet mellan alla 3 Divis. Sk.["shows the connection between all 3 Divisions Sk."] May 11, 1869 Off Conch reef Cast no. 1 Depth 30 fm. [printed 1868-1869 label] [cardboard box] **[Colony #2 measured]** (two platy to tubular multilaminar colonies orginally encrusting sponge which has been removed, approximate dimensions, 3 x 4 x 1.5 cm and 2 x 2.5 x .5 cm).

148. *Biflustra macrodon* [Label inside box:] *Steginoporella elegans* (**=*Steginoporella magnilabris***) May 11 Cast no. 1 Off Conch reef 30 fms. Pourt. 1869 [cardboard box] **[Colony #3 measured]** (Nice tubular colony, about 2x3 cm, mostly skeletal, but a few zooids still with opercula).

149. Bryozoa May 11, 1869 (**=*Hippoporella pusilla*) Syntype.** Off Conch Reef Cast no. 4 60 fm. [on underside of box:] *Discopora pusilla erecta* 51 (label inside box) *Discopora pusilla incrustans* et *erecta* [Round box] **[SEM, Figs. 310-314] [Colony # 1 measured].**

150. Bryozoa (**=*Cupuladria biporosa***) May 13, 1869 Off Pacific reef Cast no. 3 60 fms. [on underside of box] *Membranipora canariensis* [Round box] (Two small skeletal colonies: 5x5x2 mm and 5x4.5x2 mm).

151. *Porellina ciliata* & *Escharella biaperta?* (**=*Microporella protea*, n. sp. = Holotype** and ***Pourtalesella incrassata*, n. sp.**) [label inside box] *Porellina ciliata Hippothoa biaperta* [original generic name of *Porellina* was *Porina*, each now erased]. [no date] Off Cape Fear, Bald head Light NNE 14 m 9 fms Pourt. 1869 13 [on side of box] [cardboard box] **[*Microporella*, SEM, Figs. 217-233] [*Microporella* =Colony #3 measured] [*Pourtalesella* = SEM, Figs. 262-265] [*Pourtalesella* = Colony #3 measured]** (Specimens now in two boxes (both SEMed specimens in one box 151(1)).

152. [No identification] (**=*Cupuladria biporosa***) Florida reefs 1869 "Pres'd by" Pourtales (printed label) [jar supplied by Schopf] (Three large colonies of *Cupuladria biporosa*, 19x19x12 mm, 13x13x4 mm, 9x8.5x2 mm. All live when collected, largest one has a small colony of *Celleporaria albirostris* encrusting on its underside).

153. *Hippothoa Isabelleana* Smitt (*Escharina*) *Isabelleana* d'Orb. (**=*Schizoporella pungens***) Florida L. F. Pourtales [label pasted to specimen:] 4 bei 3. 2281] [box supplied by Schopf] **[Illus and SEM, Figs. 179-186] [Colony #1 measured]** (Large branching colony, about 12 cm long, 1 cm diameter, formed by several layers of encrustation around a narrow organic core).

154. *Escharella depressa*, *rostigera* [Label inside box:] *Escharella depressa rostigera* (**=*Hippaliosina rostrigera*) Syntype.** Florida Pourtales [box] **[SEM, Figs. 200-203] [Colony #1 measured]** (large colony encrusting stick like substratum, broken portion used for SEM).

155. Bryozoa (**=*Bracebridgia subsulcata*, *Schizoporella pungens*, *Parasmittina betamorphaea*, and *Stylopoma smitti*=Holotype**) Florida L. F. Pourtales [Label inside box:] Inside Floridan reef. 4 faths. L. F. P[ourtales] [wooden box,specimens wrapped in two pages of the "Proceedings B. S. N. H.-Vol. IX. May, 1862". pages 33- 34, and 39-40 were used]. **[*Bracebridgia*=colony # 3 measured] [*Stylopoma smitti*, SEM, Figs. 196-199] [*Stylopoma smitti*= colony #1 measured]** (now in 4 plastic boxes, 3 boxes of *Bracebridgia* colonies and 1 box containing the other three species).

156. Glass-Stoppered bottle. *Discoporella verrucaria* Fabr./ e *Cellularia gracilis/v.* Ben Spitzbergen Mus. Stockholm.

157. Glass-stoppered bottle. *Gemellaria loricata* /Lin/ Finnmarkes 21 dup lots. Loven (The above written on back of Spitzbergen expedition, 1861, printed label, on which, however, most of the data are crossed out. verte remains].

158. Glass-stoppered bottle. *Crisia eburnea* (1) Bohusf Loven [second label in bottle but the ink has faded to a light yellow and is no longer legible].

159. Glass-stoppered bottle. *Lepralia Angustus* ???? Spitz. Way p. [followed by illegible word] 1861 [rest of label is in Swedish; all of label except word *Mollia*, which is in pencil and was added after the original generic name was given, is badly faded].

160. Glass-stoppered bottle. *Bugula murryana* dupl.Gratsund/ Finmark 80 f. lark. var.lesied [?] Oct. 1861.

161. *Hippothoa biaperta* and *Cellepora avicularis* **(=*Pourtalesella incrassata* and *Buskea pourtalesi*).** Inside fishing ground off Cape Fear Riv. 17 fms. [glass-stoppered bottle, specimens still in alcohol]. (Colonies on a *Leptogorgia* or *Telesto*(?). Pencil label with names is legible, but ink label is now so faded that without knowing what Tom had written in 1966 it would be impossible to read).

162. (Dredge of the Blake, 1877-78, Off Bahia Honda, Cuba Dredge XXII, Jan 19 Lon. 83E lat 01' 23E 01' Dept 100 fath. See figs. of vertriculate spicules, Carter Ann & Mag. Nat. Hist. 1871 (vol. 7) 42. Compare Columnities ignmake schni of Anldler Spongs Other Specimen sent to Mnilay 32 Queen h. NW 26/85 a by see letter book [box supplied by Schopf] (This is from Florida, but not from the 1868 or 1869 cruises and not Smitt bryozoan material. It appears to be a sclerosponge).

163. *Cellularia cervicornis* **(=*Scrupocellaria regularis*)** [No locality data or other label, apparently taken from a broken container] [vial supplied by Schopf] **[SEM, Figs. 63-68] [Colony #1 measured].**

164. *Anarthropora borealis* [Attached tag:] *Tessaradoma boreale* **(=*Tessaradoma boreale*)** [second label] [May 1, 1868, Dredge 3] Off Sombrero, Fla. 183 fathom [vial] (16+ branch fragments, including some nice branching and anastomosing colonies attached to hydroid stolon, with cuticle, no ovicells).

165. [Attached tag:] *Crisia eburnea* **(=*Crisia carolina*)** Inside Fishing Ground off Cape Fear Riv. bar 17 fm. [test tube] **[SEM, figs. 342-344].**

166. *Discopora albirostris* **(= *Celleporaria albirostris*) Syntype.** Type for figs, 234-235, by Smitt [on back of label] Jan 18, 1869 SW of Tortugas Cast No. 1 25 fm. verte! [Printed 1868-1869 label.] [on underside of box] *Discopora skenei* 3. Bjorkman 167, 186, 169 [erased from back of label:] B-n 167, 168, 169. [round box] **[Illus. Fig. 131]** (Note: Bjorkman was the illustrator or printer of the plates for the two papers).

167. *Canda reticulata* Pourt. **(=*Canda retiformis*) Syntype.** 270 fathoms off Havana [outside label] [label inside vial] *Canda reticulata* Pourt [*Cellepora reticulata* in Pourtales 1867 paper] May 29 [1867] Off Chorrera [Cuba] 270 fathm. [vial] (a few dry branch fragments).

168. *Canda retiformis* Pourt 270 faths. Off Havana [1867] **Syntype (=*Canda retiformis*)** [attached tag] *Caberea retiformis*. [Round box] **[SEM, Figs. 53-56] [Colony #1 measured]** (2 branch fragments, SEM and measured, 29 short fragments remain in both, still had cuticle when collected).

169. *Farcimia cereus* **(=*Amplexicamera cereus*) Syntype.** Bjorkman 47 & 48 (1867) [label inside box] *Farcima cereus* Pourt., 270 fm., Off Havana [round cardboard box] **SEM, Figs. 20-29] [Colony #1 measured]** (6 fragments, one SEMed).

170. *Vinc. margaritacea* Pourt *Cellepora Margaritacea* [label inside box] *Cellepora margaritacea* [Second label inside box] *Vincularia margaritacea* Pourt.**(=*Buskea margaritacea*) Syntype** [label on outside lid of box] 100 fathoms Off Sand Key, Fla., 1867 [May 17] [On underside of box:] [round box] (Fifteen branch fragments).

171. *Anarthropora borealis* May 1 1868 3rd Dredging [Off Sombrero] 183 fm [was with #33] [Vial] (Six branch fragments, three with colony bases).

172. *Hippothoa biaperta* [original generic name erased] **(=*Pourtalesella incrassata*)** 1868 Off West Bar, Cape Fear River 7 fms. Pourt. 1868 [was with #11] [vial] **[Colony # 2 measured]** (Four fragments of a branching colony encrusting a gorgonian or octocoral).

173. *Escharella depressa, rostigera* **(=*Hippaliosina rostrigera*) Syntype.** [Original species name erased.] [pencil label.] Florida Pourt. 1869 [was with #76] [Vial] **[SEM, Figs. 204-206] [Colony #3 measured]** (Small colony encrusting chip of calcareous algae. This colony has wider zooids and larger avicularia).

174. *Retepora marsupiata* obs. de [followed by two illegible words, original species and additional remark (name?) erased] (**=*Reteporellina marsupiata***) **Syntype.** Jan 22, 1869 Cast No. 3 S. of Rebecca channel 16 1/2 fm. Printed 1868-1869 label. [was with #79] [vial].

175. *Cellepora tuberosa* [original generic and specific name erased] (**=*Buskea minutiporosa***) May 4, 1868 9 D[redging] [Off Bahia Honda] [was with #89] 119 fms. [vial] (one nodular colony).

176. *Escharipora stellata Discopora pertusa* (**=*Triporula stellata*= Syntype.** and ***Gemelliporidra pertusa*=** Syntype) Jan 16 Cast No. 12 W. of Tortugas 42 fms. Pourt. 1869 [was with #90] [vial] [***Gemelliporidra*** **SEM, Figs. 207-210] [*Gemelliporidra*=Colony#1 measured]** (colonies encrusting a nodular calcareous substratum).

177. *Mamillopora cupula*, Sm.(**=*Mamillopora cupula***) **Syntype.** [On separate label] March 21 Cast No. 7 Off Carysfort reef 40 fms. Pourt. 1869 [was with #108] [Description remarks on back of label in Swedish: "Tdyl. avicularien (vibracularien por baksiden of Kolonien ..., translated as "Many of avicularia (vibracula) on back side of colonies. They are of the same form and size as those on colonies' front sides"] [vial] (2 colonies, one, live when collected, one more abraded, both more low dome rather than thimble-shaped, 6 x 6.5 x 1.5 mm, 6 x 6.5 x 2 mm).

178. *Lepralia turrita* [original generic and species names erased]= *Lepralia* 3 ? [erased] (**=*Trematooecia turrita***) **Syntype.** May 1 Cast No. 7 26 fms. Pourt. 1868 [was with #109] [Vial] **[Colony #3 measured]** (skeletal, young colony, orifices nice and clear, spines short, no ovicells or avicularia, on calcareous nodule).

179. *Escharipora stellata* [in ink; *Porina* 2, erased, in pencil] (**=*Triporula stellata***) **Syntype.** May 1, 1868 3 D[redging] [Off Sombrero] 183 fm. [printed label,] 1868 [was with #13] [vial] (large, live colony, encrusting calcareous substratum).

180. [No identification]. [Attached tag] *Porina subsulcata* (**=*Bracebridgia subsulcata***) **Syntype.** Jan 16 Cast No. W. of Tortugas 37 fms. Pourt. 1869 [was with #70] [vial] (Two branch fragments, good condition, live when collected).

181. *Discopora albirostris* [original species name erased] (**=*Trematooecia aviculifera***) January 16, 1869 W. of Tortugas Cast No. 9 37 fm. [Printed Label, 1869] [was with #9] [vial] **[illus. Fig. 298] [Colony #1 measured]** (Pear shaped nodular colony, about 10x15x10 mm, live when collected, attached to calcareous fragment).

182. *Cellepora margaritacea* (Pourtales) [Original generic name erased] (**=*Buskea margaritacea***) Feb 17, 1869 SW of Sand Key Cast No. 2 125 fm. [printed label,] 1868-69 [was with #8] [Test-tube] (Five branch fragments, live when collected, ovicelled).

183. *Cellepora margaritacea* (Pourt) [original generic and species names erased] (**=*Buskea margaritacea***) [May 16] Off Sand Key 4 & 5 D[redging],120 fm. [printed label,] 1868 [Was with #66]. [box] (Many branch fragments, including some large thick branches, some dead and skeletal, some with cuticle. Colony bases covered with sponge, no ovicells noted).

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RE-DESCRIPTION AND REVISION OF SMITT'S "FLORIDAN BRYOZOA" IN THE COLLECTION OF THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY

VMNH Memoir 7. Pp. ix 1-152. Figs. 1-371. 2005.

This monograph describes and updates the nomenclature and classification of the "Floridan Bryozoa" collected in 1862-69 by L. F. de Pourtalès and named by F. A. Smitt in 1872-73. This material, now in the Museum of Comparative Zoology, includes specimens of 68 species, upon which (in addition to those recognized by Smitt), are based 15 new species and four new genera. Four new families are also proposed to accomodate the new taxa in the modern classification of this group. All species are illustrated by large, detailed SEM images.

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